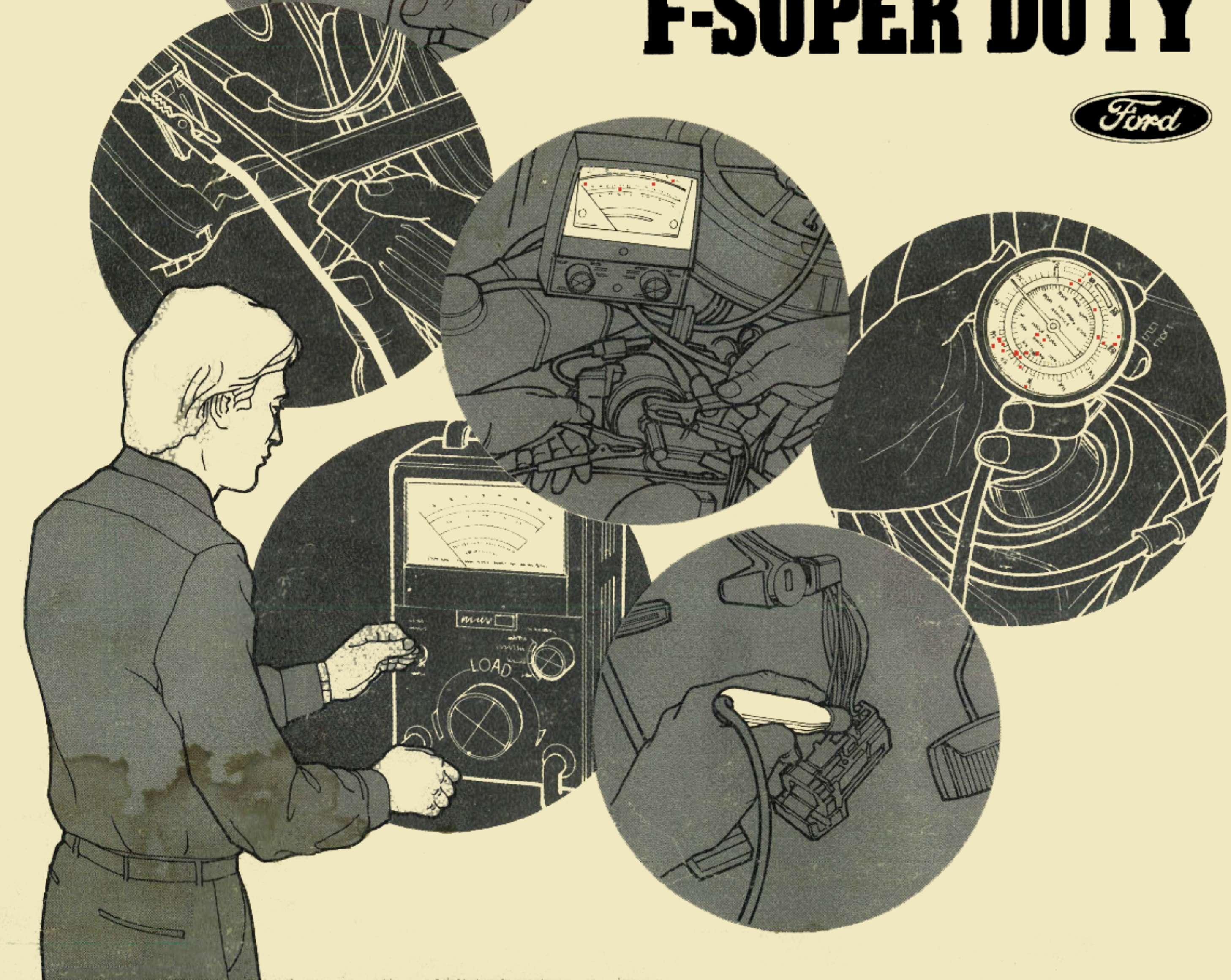
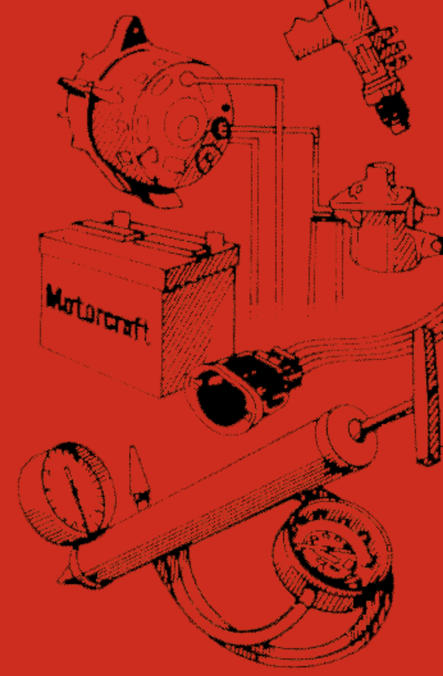
1989 BRONCO/ F150-F350/ F-SUPER DUTY

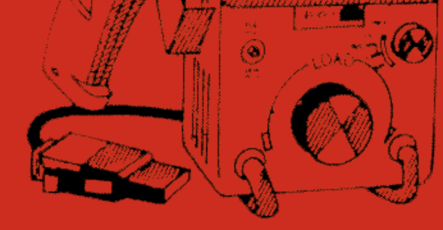




Ford



Electrical & Vacuum Trouble-Shooting Manual



ELECTRICAL AND VACUUM TROUBLESHOOTING MANUAL

FPS — 12129 - 89

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SYSTEM INDEX

IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles, as well as the personal safety of the individual doing the work. This Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that he compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

This manual contains the following diagnostic information:

- Electrical and Vacuum Schematics
- Component Location Indexes and Views
- Troubleshooting Hints
- Descriptions of Circuit Operation
- Component Testing

The vehicle's entire electrical system is broken down into individual systems. There are also sections for the vehicle's ground and power distribution circuitry. Each system section begins with a wiring schematic. The **Schematics** should always be your starting point in using this manual. These schematics show the paths of electrical current during proper circuit operation. The source of voltage (circuit breaker or fuse) is shown at the top of the page. All wire, connectors, splices, switches, and motors are shown in the flow of current to ground at the bottom of the page. Connector end views of switches and other components are shown to help with bench testing. Each circuit component is named (underlined titles). Wire and connector colors are listed (standard Ford color abbreviations are used). These abbreviations are:

COLOR ABBREVIATIONS

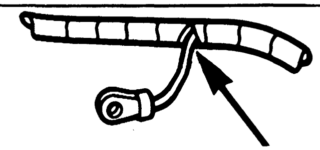
BL	**Blue**	**N**	**Natural**
BK	**Black**	**O**	**Orange**
BR	**Brown**	**PK**	**Pink**
DB	**Dark Blue**	**R**	**Red**
DG	**Dark Green**	**P**	**Purple**
GR	**Green**	**T**	**Tan**
GY	**Gray**	**W**	**White**
LB	**Light Blue**	**Y**	**Yellow**
LG	**Light Green**		

Where two colors are shown for a wire, the first color is the basic color of the wire. The second color is the stripe marking.

The **Component Location** section of each system helps you locate the circuit's components in the vehicle. A brief statement of the location is given as well as a reference to an illustrative figure in the manual. There is also a full listing of connector, ground, diode, and splice locations in the **Location Index** in the back of the manual.

Resistors and diodes are currently covered with pvc molds and are taped to the harness outside of the tubing. Many of the 1989 model year assemblies will be covered with heat shrinkable tubing making the assembly small enough to be placed within the harness bundle. The wiring diagrams show the number of times the resistor and diodes are used as well as the distance from connector/length of wire in exact centimeters. Resistors and diodes are identified on the wiring diagrams by the following base part numbers:

Resistor/diode assembly	14A601
Diode only	14A604



OTHER ABBREVIATIONS

T/O (Tape Out) **The point at which a harness branches to feed a component.**

The **Troubleshooting Hints** offer shortcuts or tests in a three-column format that help you determine the cause of an electrical problem. They are not intended to be a rigid procedure for solving an electrical situation. Rather, Troubleshooting Hints represent a common-sense approach that is based on an understanding of the circuit.

A description of **How the Circuit Works** is written to help you understand the operation of the circuit as a whole. Emphasis is placed on how the components and circuitry interact in a properly working system.

A **Component Testing** section provides procedures to determine whether a component is good or bad.

Notes, Cautions, and **Warnings** appear in boxes on text pages and contain important **vehicle and mechanic safety information.**

Notes give added information to help complete a particular procedure. Cautions are included to prevent making an error that could damage the vehicle. Warnings highlight areas where carelessness can cause personal injury. The following list contains some general **Warnings** that should be followed when working on a vehicle.

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires being under a vehicle.
- Be sure that the **Ignition Switch** is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on any vehicle. An automatic transmission should be in PARK. A manual transmission should be in NEUTRAL.
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide.
- Keep away from moving parts when the engine is running, especially the fan and belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter, and muffler.
- Do not allow flame or sparks near the battery. Gases are always present in and around the battery cell. An explosion could occur.
- Do not smoke.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing.

TROUBLESHOOTING STEPS

These six steps present an orderly method of troubleshooting:

Step 1. Verify the problem.

- Operate the complete system and see all symptoms for yourself in order to:
  - —check the accuracy and completeness of the customer's complaint.
  - —learn more that might give a clue to the nature and location of the problem.

Step 2. Narrow the problem.

- Using this manual, narrow down the possible causes and locations of the problem in order to more quickly find the exact cause.
- Read the description of *How the Circuit Works* and study the wiring diagram. You should then know enough about the circuit operation to figure out where to check for this trouble.

Step 3. Test the cause.

- Use electrical test procedures to find the specific cause of the symptoms.
- *Troubleshooting Hints* will give some helpful ideas.
- The *Component Location* charts and the pictures will help you find components, grounds, and connectors.

Step 4. Verify the cause.

- Confirm the fact that you have found the correct cause through operating the parts of the circuit you think are good.

Step 5. Make the repair.

- Repair or replace the faulty component.

Step 6. Verify the repair.

- Operate the system as in Step 1 and check that your repair has removed all symptoms, and also has not caused any new symptoms.

Some engine circuits may need special test equipment and special procedures. See the *Shop Manual* and other service books for details. You will find the circuits in this manual to be helpful with these special tests.

TROUBLESHOOTING TOOLS

JUMPER WIRE

This is a test lead used to connect two points of a circuit. A **Jumper Wire** can complete a circuit by bypassing an open.

Uses: Bypassing Switches or Open Circuits

> *WARNING*
>
> *Never use a jumper wire across loads (motors, etc.) connected between hot and ground. This direct battery short may cause injury or fire.*

VOLTMETER

A DC **Voltmeter** measures circuit voltage. Connect negative (- or black) lead to ground, and positive (+ or red) lead to voltage measuring point.

OHMMETER

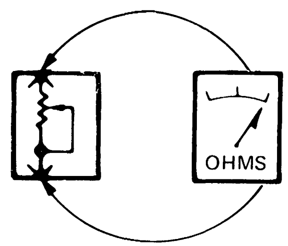


Figure 1— Resistance Check

An **Ohmmeter** shows the resistance between two connected points (Figure 1).

TEST LIGHT

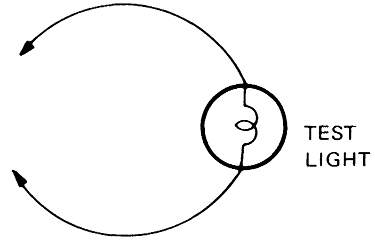


Figure 2 —Test Light

A **Test Light** is a 12-volt bulb with two test leads (Figure 2).

Uses: Voltage Check. Short Check

SELF-POWERED TEST LIGHT

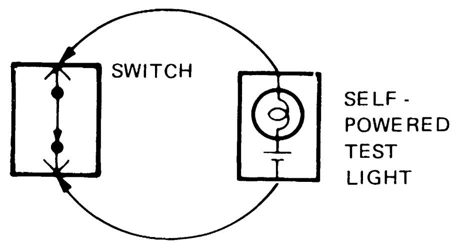


Figure 3—Continuity Check

The **Self-Powered Test Light** is a bulb, battery and set of test leads wired in series (Figure 3). When connected to two points of a continuous circuit, the bulb glows.

Uses: Continuity Check. Ground Check

> *CAUTION*
>
> *When using a self-powered test light or ohmmeter, be sure power is off in circuit during testing. Hot circuits can cause equipment damage and false readings.*

TROUBLESHOOTING CHECKS

SWITCH CIRCUIT CHECK

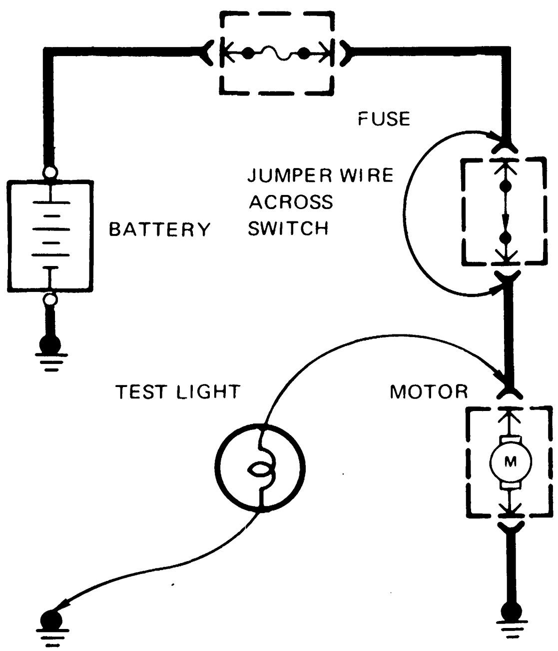


Figure 4—Switch Circuit Check and Voltage Check

In a bad circuit with a switch in series with the load, jumper the terminals of the switch to power the load. If jumping the terminals powers the circuit, the switch is bad (Figure 4).

CONTINUITY CHECK (Locating open circuits)

With power off, connect one lead of **Self-Powered Test Light** or **Ohmmeter** to each end of circuit (Figure 3). Light will glow if circuit is closed. Switches and fuses can be checked in the same way.

VOLTAGE CHECK

Connect one lead of **Test Light** to a known good ground or the negative (-) battery terminal. Test for voltage by touching the other lead to the test point. Bulb goes on when the test point has voltage (Figure 4).

SHORT CHECK (short to ground)

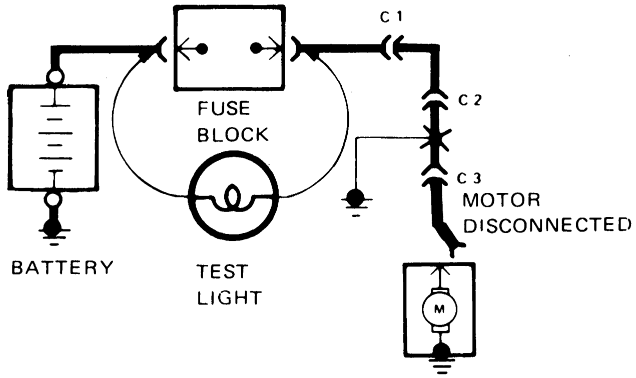


Figure 5— Short Check

A fuse that repeatedly blows is usually caused by a short to ground. It's important to be able to locate such a short quickly (Figure 5).

1) Turn off everything powered through the fuse.
2) Disconnect other loads powered through the fuse:
   - Motors: disconnect motor connector.
   - Lights: remove bulbs.
3) Turn **Ignition Switch** to RUN (if necessary) to power fuse.
4) Connect one **Test Light** lead to hot end of blown fuse. Connect other lead to ground. Bulb should glow showing power to fuse. *(This step is just a check to be sure you have power to the circuit.)*
5) Disconnect the **Test Light** lead from ground and reconnect it to the load side of the fuse.
   - If the **Test Light** is off, the short is in the disconnected equipment.
   - If the **Test Light** goes on, the short is in the wiring. You must find the short by disconnecting the circuit connectors one at a time until the **Test Light** goes out. For example: with a ground at X, the bulb goes out when C1 or C2 is disconnected, but stays on after disconnecting C3. This means the ground is between C2 and C3.

"GOOD GROUND" CHECK

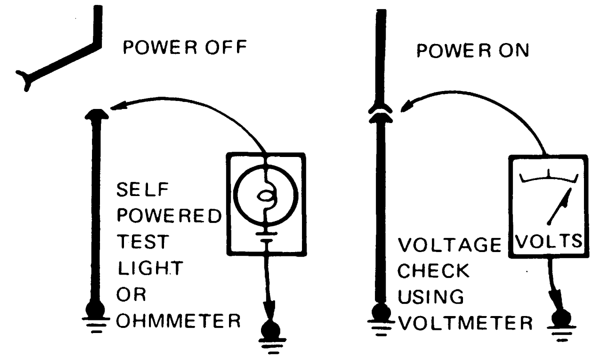


Figure 6 — Grounds Checks

Turn on power to circuit. Perform Voltage Check between suspected bad ground and frame. Any voltage means ground is bad.

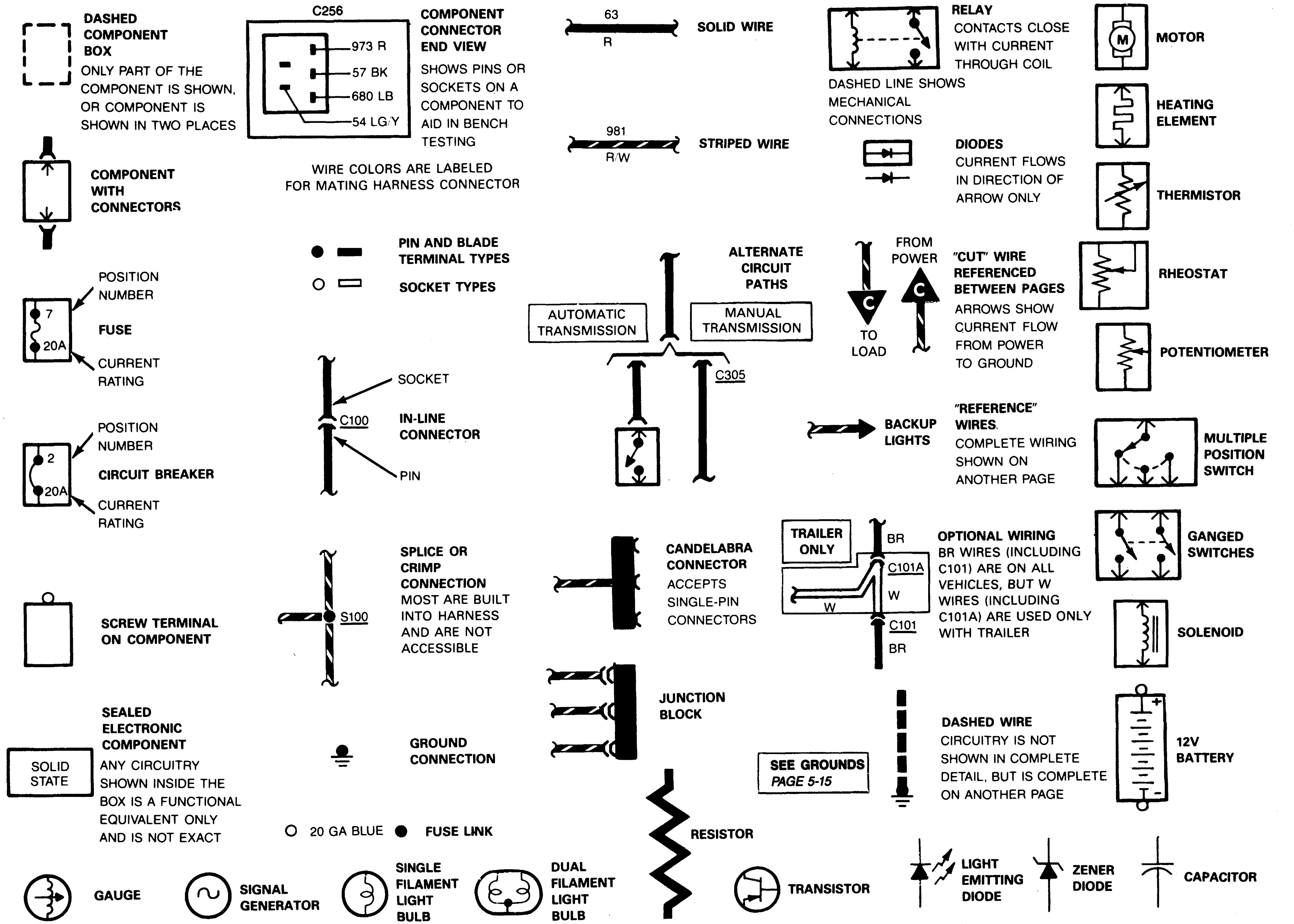
Turn off power to circuit. Connect one lead of **Self-Powered Test Light** or **Ohmmeter** to wire in question, and the other to known ground. If bulb glows, circuit ground is OK (Figure 6).

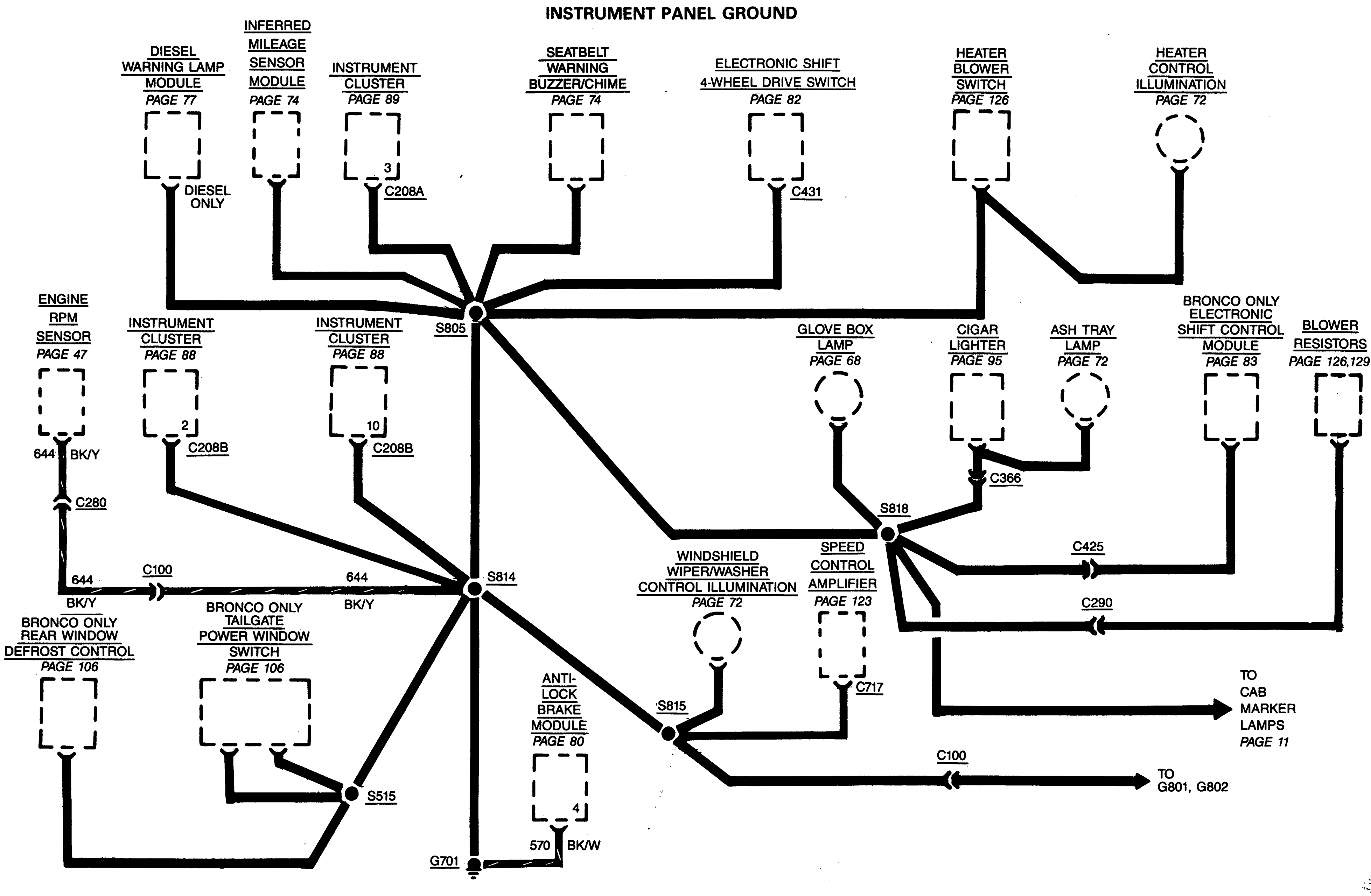
TROUBLESHOOTING HINTS

The circuit schematics in this manual are designed to make it easy to identify common points in circuits. This knowledge can help narrow the problem to a specific area. For example, if several circuits fail at the same time, check for a common power or ground connection. (See *Power Distribution* or *Grounds).* If part of a circuit fails, check the connections between the part that works and the part that doesn't work.

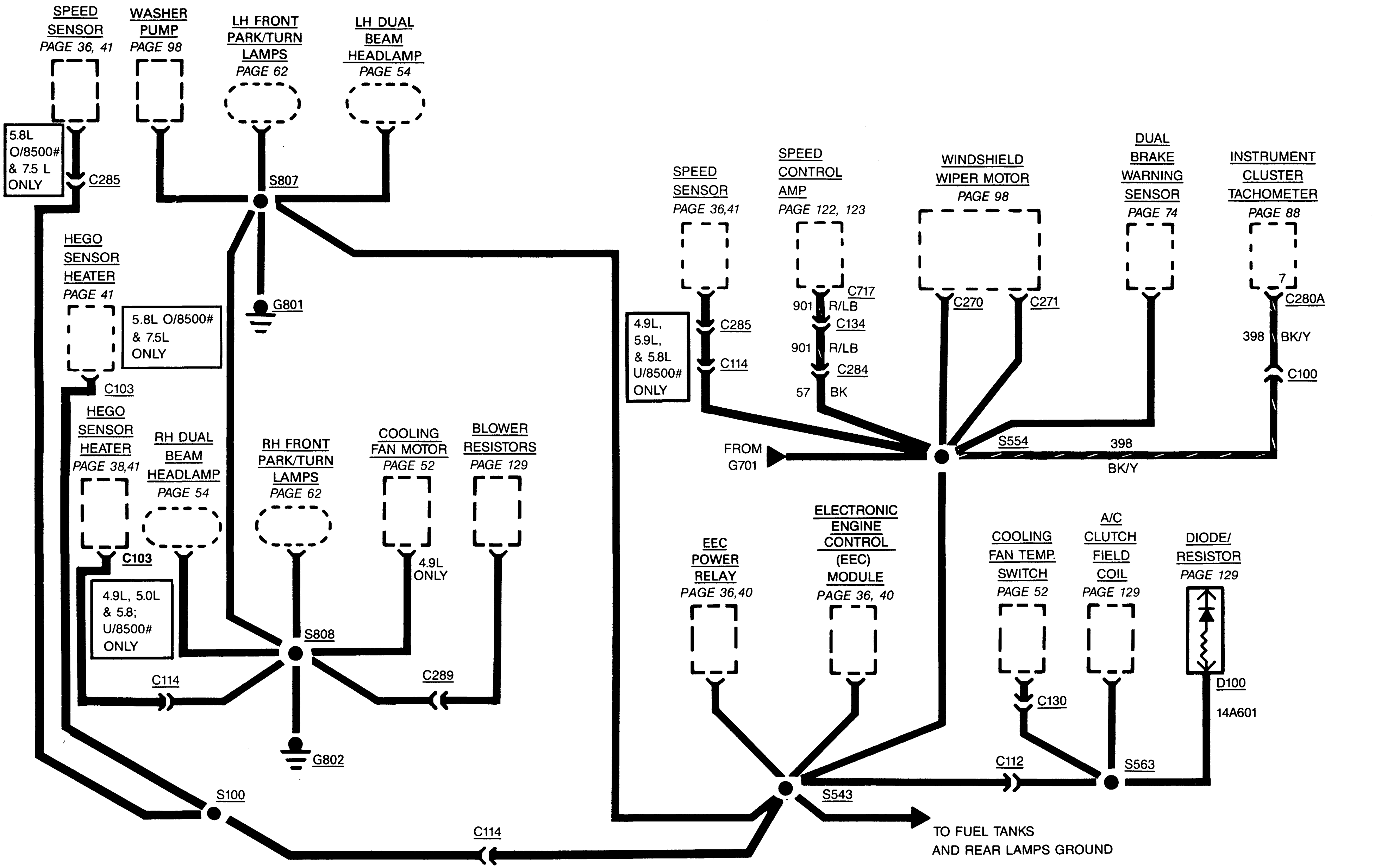
For example, if low beam headlights work but high beams and the indicator light don't work, then power and ground paths must be good. Since the dimmer switch is the component which switches this power to the high beam lights and indicator, it is most likely the cause of failure.

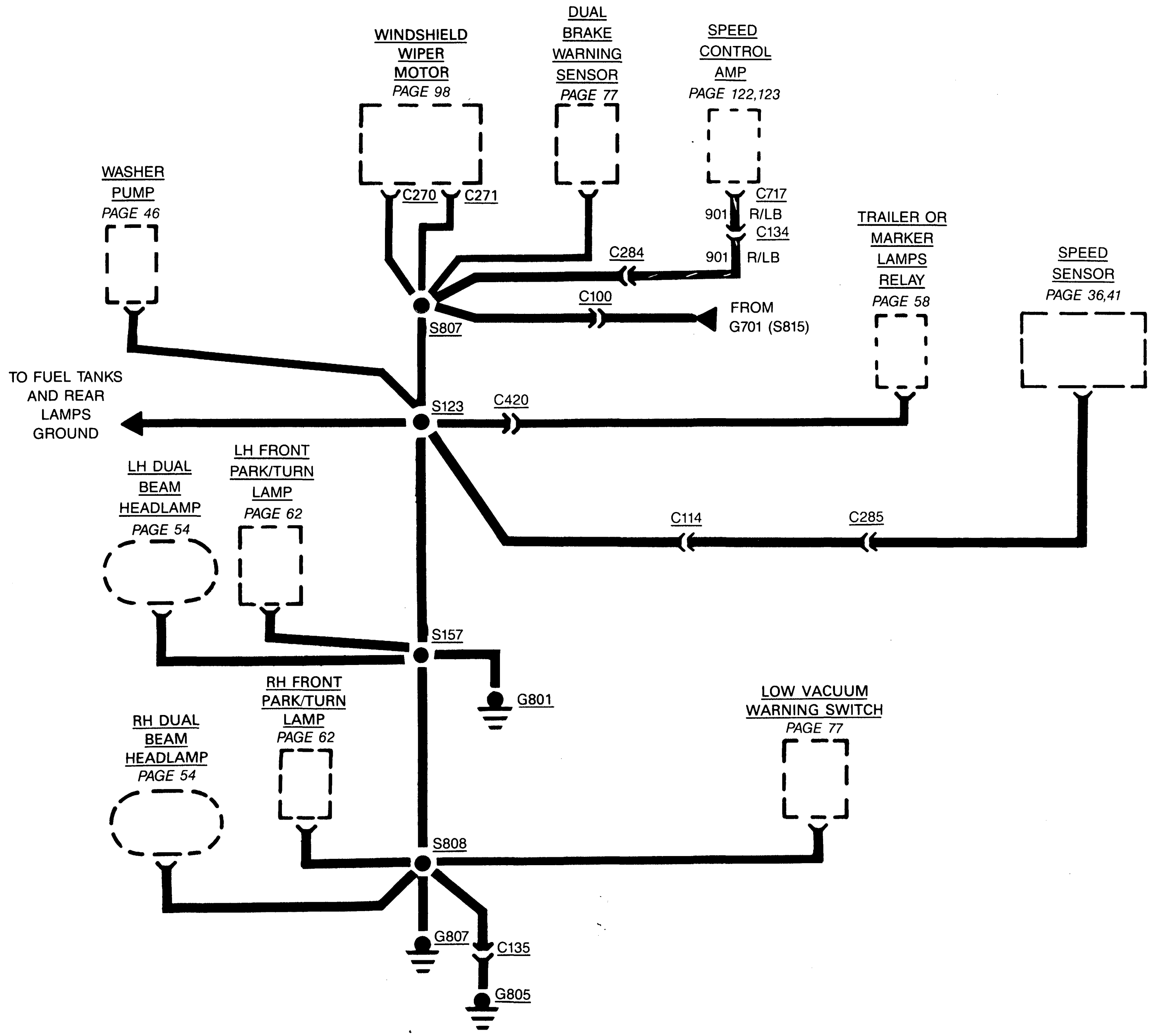
ELECTRICAL SYMBOLS



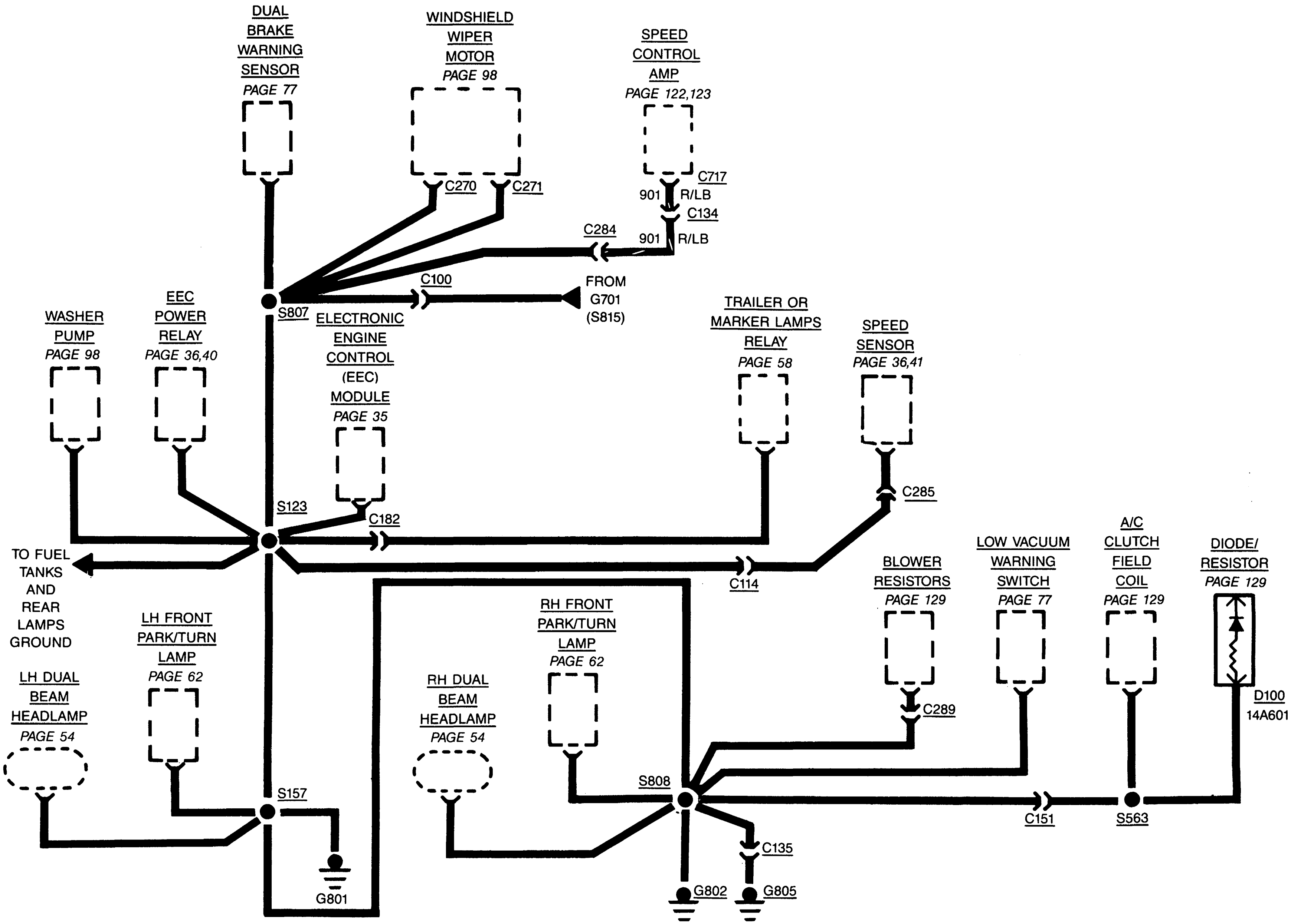

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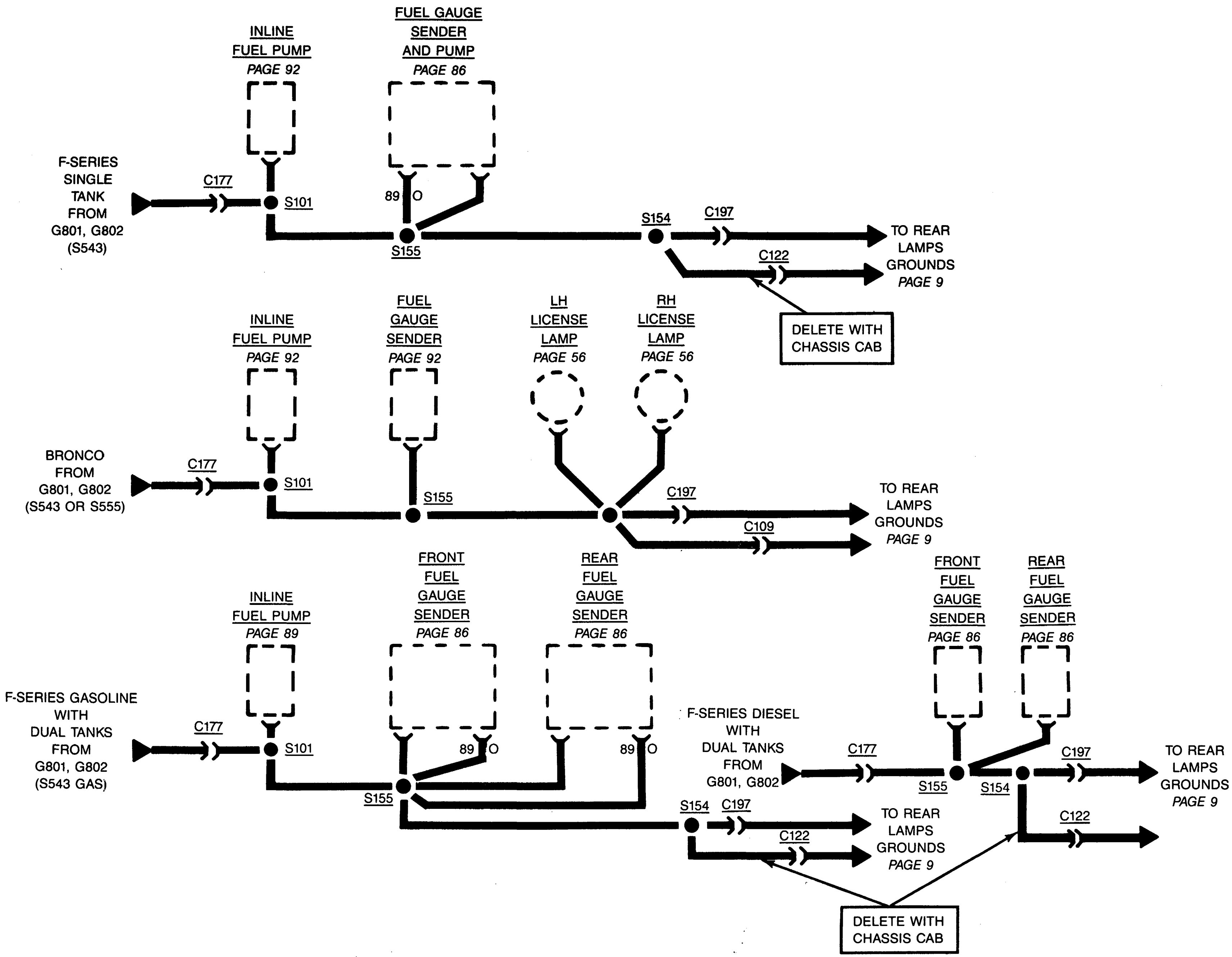
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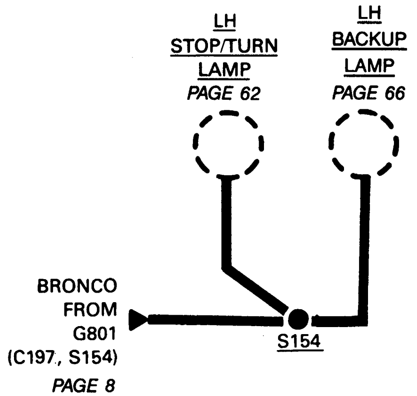


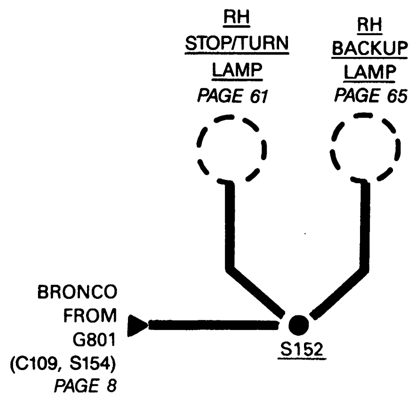

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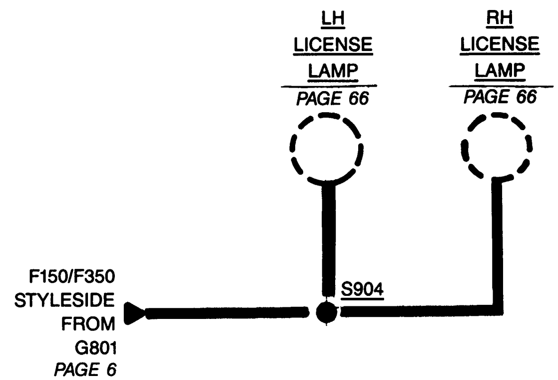
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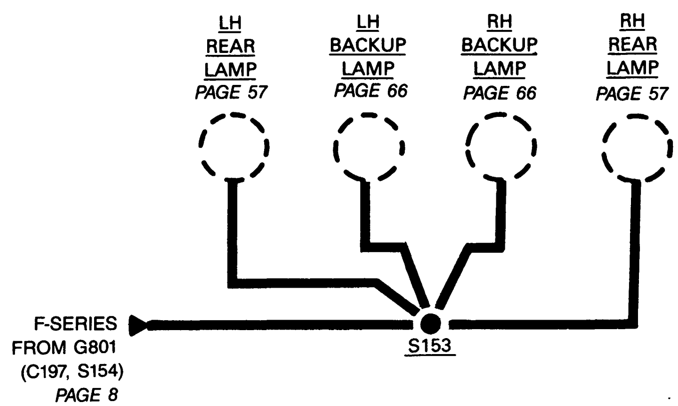


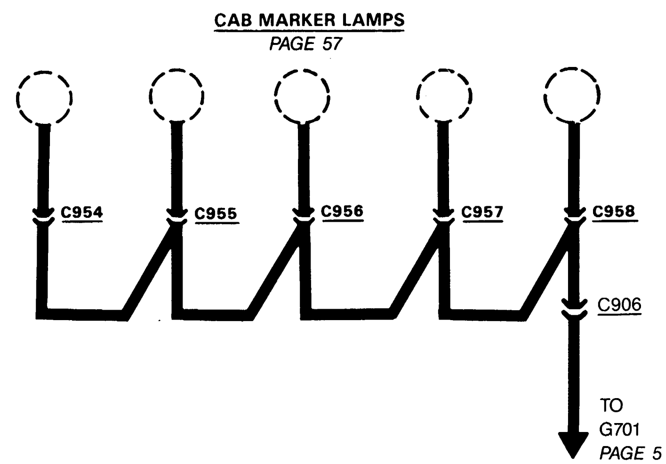

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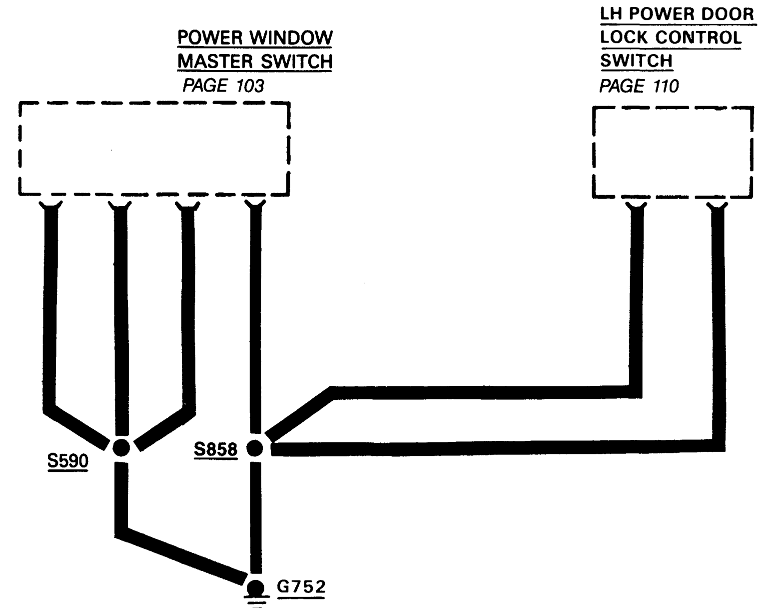

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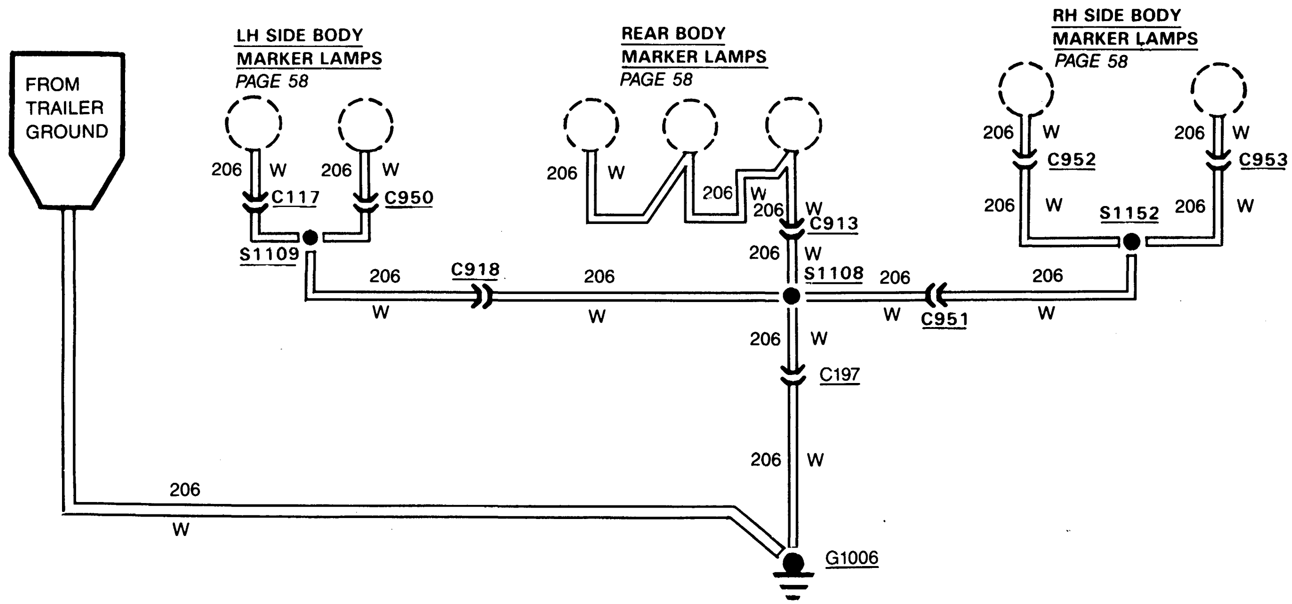

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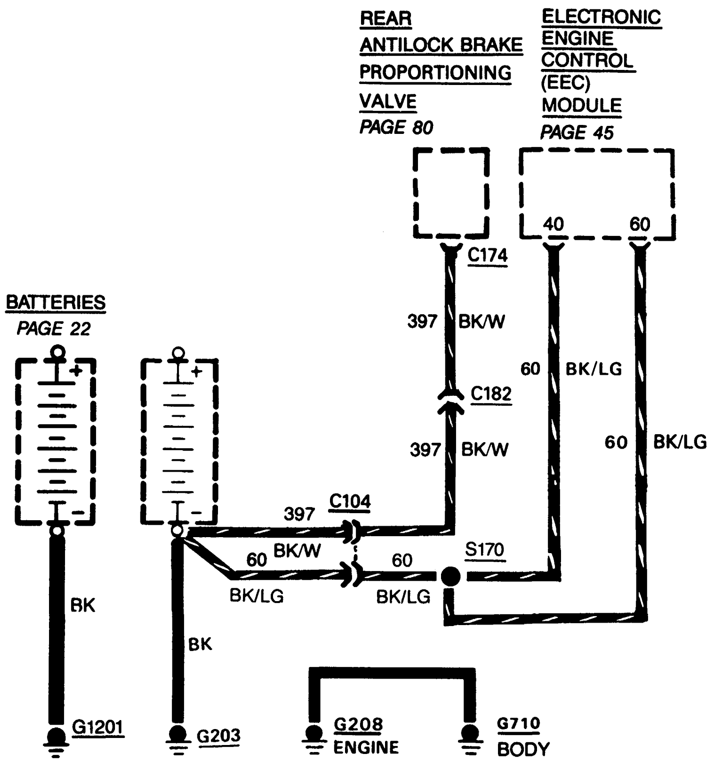

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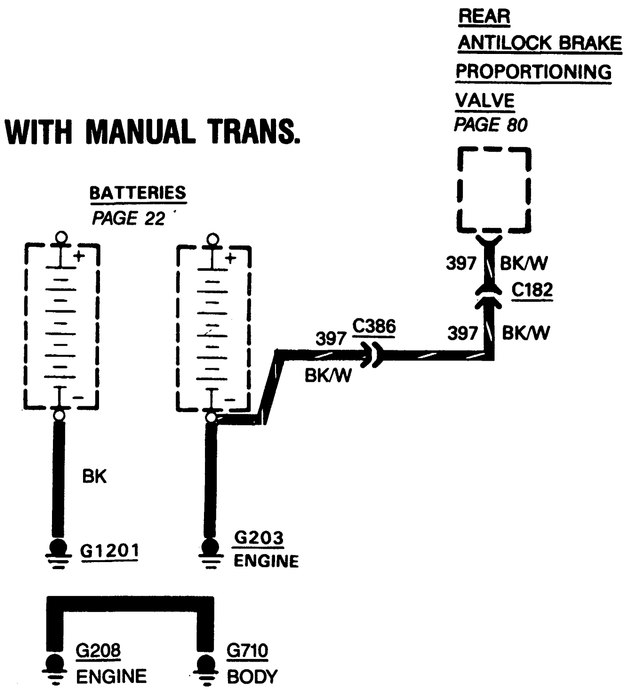

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DIESEL WITH MANUAL TRANS.



HOW THE CIRCUIT WORKS

The ground circuits shown here are complete and connect several components together to screw terminal ground points. On other pages only parts of these circuits may be shown. Partial ground circuits are shown dashed on those pages.

All simple or component ground circuits are shown on the individual circuit pages and are complete on those pages.

All ground wires are **57 BK** unless otherwise noted.

COMPONENT LOCATION

Component	Location	Page-Figure
A/C Clutch Field Coil	Part of compressor	
Anti-Lock Brake Module	Behind I/P left of center	
Blower Resistors	Mounted to plenum next to blower	131-1
Brake Sensor	Part of master cylinder	
Cooling Fan Motor	RH fender apron	
Diesel/Warning Lamp Module	Behind LH side of I/P near fuse panel	
Electronic Engine Control (EEC) Module	Behind LH kick panel	
EEC Power Relay	Under plastic shield at the air cleaner support bracket	
Rear Anti-lock Brake Proportioning Valve	Inside of LH frame rail behind #1 cross-member	
Electronic Shift 4 Wheel Drive Control Module	RH cowl panel	
Fuel Tank Selector Valve	On LH side frame member behind cab	91-1
Heater Blower Switch	At center of I/P	
Refer to Component Testing Page 000 for additional testing details.		
HEGO Sensor	In communicator tube connecting both exhaust pipes	134-2,135-3
Inferred Mileage Sensor	Attached to instrument panel to left of steering column	
Inline Fuel Pump	Inboard side of LH frame rail	
Low Vacuum Warning Switch	7.3L RH fender apron	
Power Window Master Switch	In LH door	
Rear Defrost Control	Under LH corner of I/P	
Seatbelt Warning Buzzer/Chime	Attached to rear RH side of I/P	
Electronic Shift 4-Wheel Drive Switch	On LH side of I/P	
Speed Sensor	At transmission	
Tailgate Power Window Motor	In center of tailgate	109-3
Washer Pump	In washer reservoir	
Windshield Wiper Motor	Attached to center of dash panel	

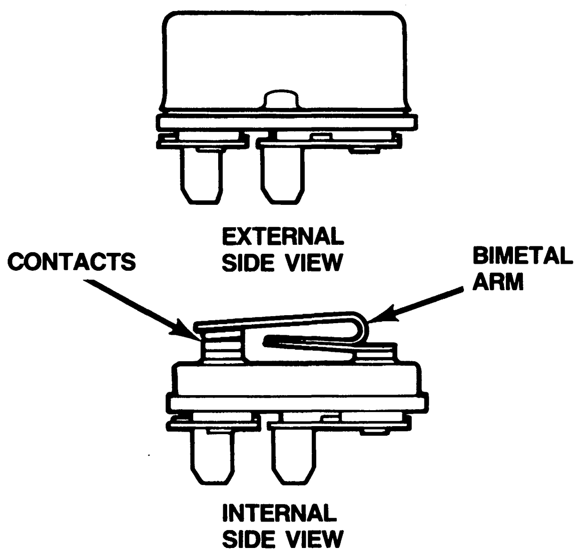
Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

REPLACEMENT OF FUSES/ CIRCUIT BREAKERS

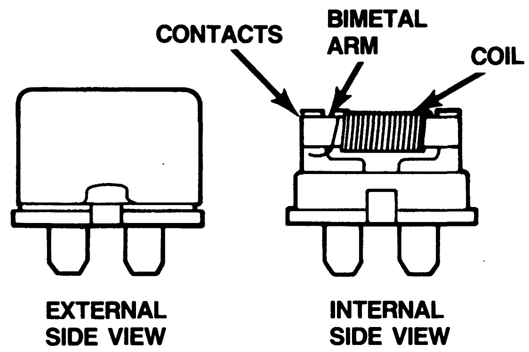


Fuses are mounted either in the **Fuse Panel** or in-line. They are identified by the numbered value in amperes, and by a color code. Some positions may have either a fuse with adapter or a circuit breaker. Be sure to replace a fuse or circuit breaker with the same kind of unit and with the same ampere rating. Remove fuses in order to check them.

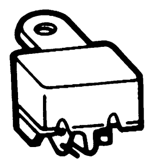
CIRCUIT BREAKER OPERATION



Cycling Fuse Panel Type



Non-Cycling Fuse Panel Type



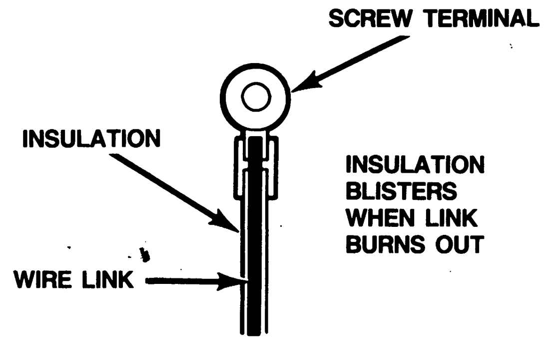
Cycling In-Line Type

Some circuits are protected by circuit breakers. (Abbreviated "c.b." in fuse chart.) They can be **Fuse Panel** mounted or in-line. Like fuses, they are rated in amperes.

Each circuit breaker conducts current through an arm made of two types of metal fastened together (bimetal arm). If the arm starts to carry too much current, it heats up. As one metal expands faster than the other the arm bends, opening the contacts. Current flow is broken. In the cycling type, the arm cools and straightens out. This closes the circuit again. This cycle repeats as long as the overcurrent exists, with power applied.

In the non-cycling type, there is also a coil wrapped around the bimetal arm. When an overcurrent exists and the contacts open, a small current passes through the coil. This current through the coil is not large enough to operate a load, but it does heat up both the coil and bimetal arm. This keeps the arm in the open position until power is removed.

FUSE LINKS



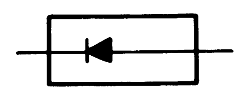
The fuse link is a short length of wire smaller in gauge than the wire in the protected circuit. The wire is covered with a thick non-flammable insulation. An overload causes the link to heat and the insulation to blister. If the overload remains, the link will melt, causing an open circuit. The links are color coded for wire size as follows:

COLOR CODE

BLUE	20 GA
BROWN	18 GA
BLACK	16 GA
GREEN	14 GA

When replacing, make tight crimp joints or hot solder joints for good connections.

DIODES



Diodes are electrical devices that permit current to flow in one direction only. The current flows in the direction indicated by the arrow.

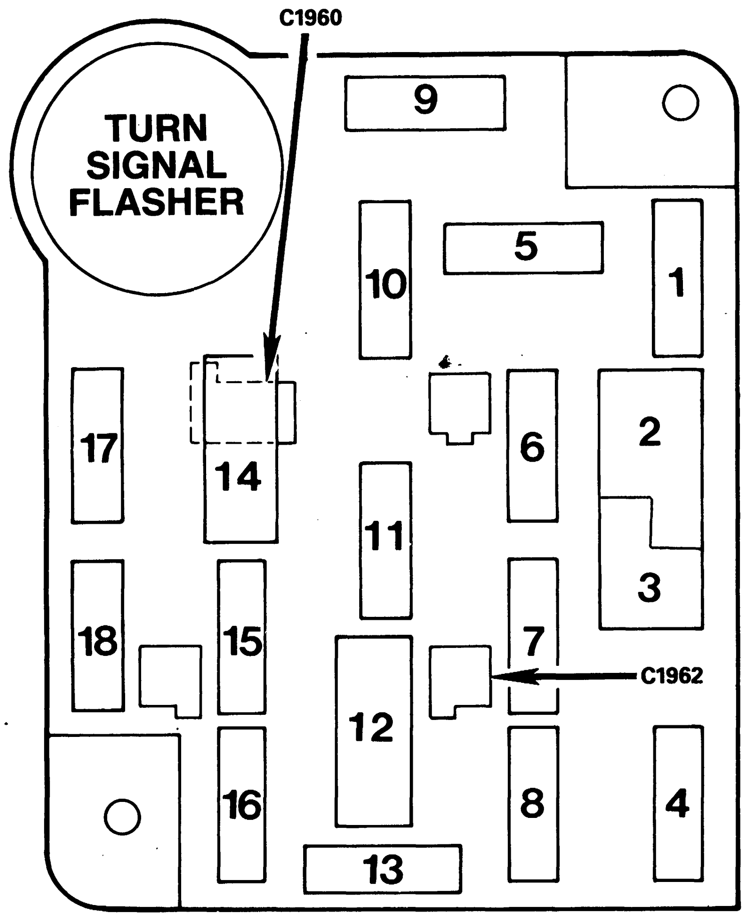


Figure 1 - Fuse Panel

Fuse Position	Amps	Circuits Protection
1	15	Stop/Hazard Lamps; Speed Control
2	—	(Not used)
3	—	(Not used)
4	15	Exterior Lamps; Instrument Illumination; Glove Compartment Lamp;
5	15	Map Lamp; Turn Lamps; Backup Lamps; Rear Window Defrost; E40D Transmission
6	15	Speed Control; Electronic Shift-4 Wheel Drive; Cargo Lamp (Bronco)
7	—	(Not Used)
8	15	Courtesy, Dome, Cargo Lamp (F-Series); Warning Buzzer
9	30	Heater; A/C-Heater
10	5	Instrument Illumination; Clock Dimming
11	15	Radio; Main Light Switch; Clock Illumination
12	25	Tailgate Power Window; Power Mirrors
	30 c.b.	Power Door Locks; Electronic Shift-4 Wheel Drive
13	—	(Not used)
14	25	Tailgate Power Window
	30 c.b.	Power Windows
15	10	Auxiliary Fuel Tank Selector
16	30	Horn; Cigar Lighter; Speed Control; 4.9L EFI After Run Blower
17	20	Anti-lock Brakes
18	15	Seatbelt Buzzer; Warning Indicators; Diesel Glow Plug Control; Diesel Indicators; Tachometer

Fuse Value Amps	Color Code
4	Pink
5	Tan
10	Red
15	Light Blue
20	Yellow
25	Natural
30	Light Green

Power Distribution

The **Alternator** and **Battery** are connected together at the **Starter Relay** hot terminal. Other circuits originate at the **Starter Relay** hot terminal and are protected by fuse links. Low power circuits are also protected by fuses.

The **Ignition Switch** and **Main Light Switch** are powered at all times as are **Fuses 1, 4, 8, 12,** and **16.** The other fuses are powered through the **Ignition Switch** or the **Main Light Switch.**

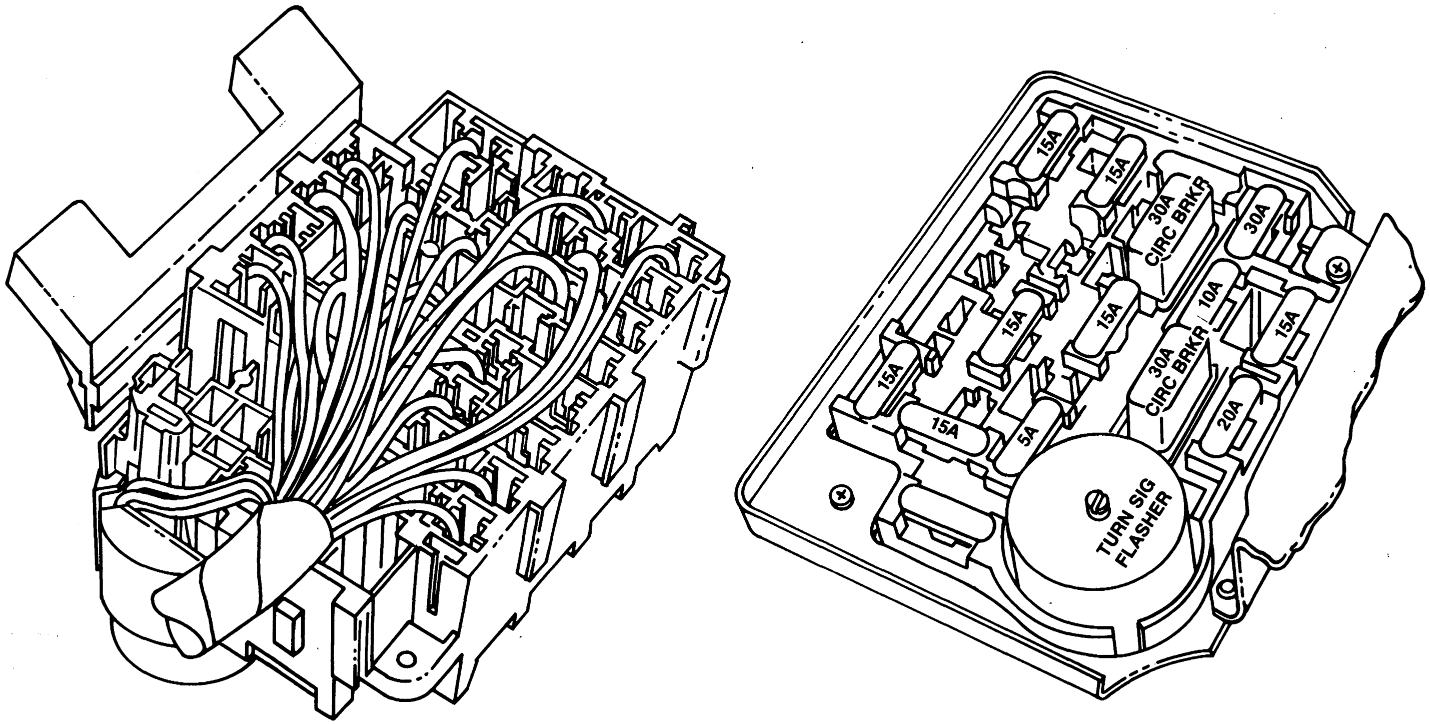
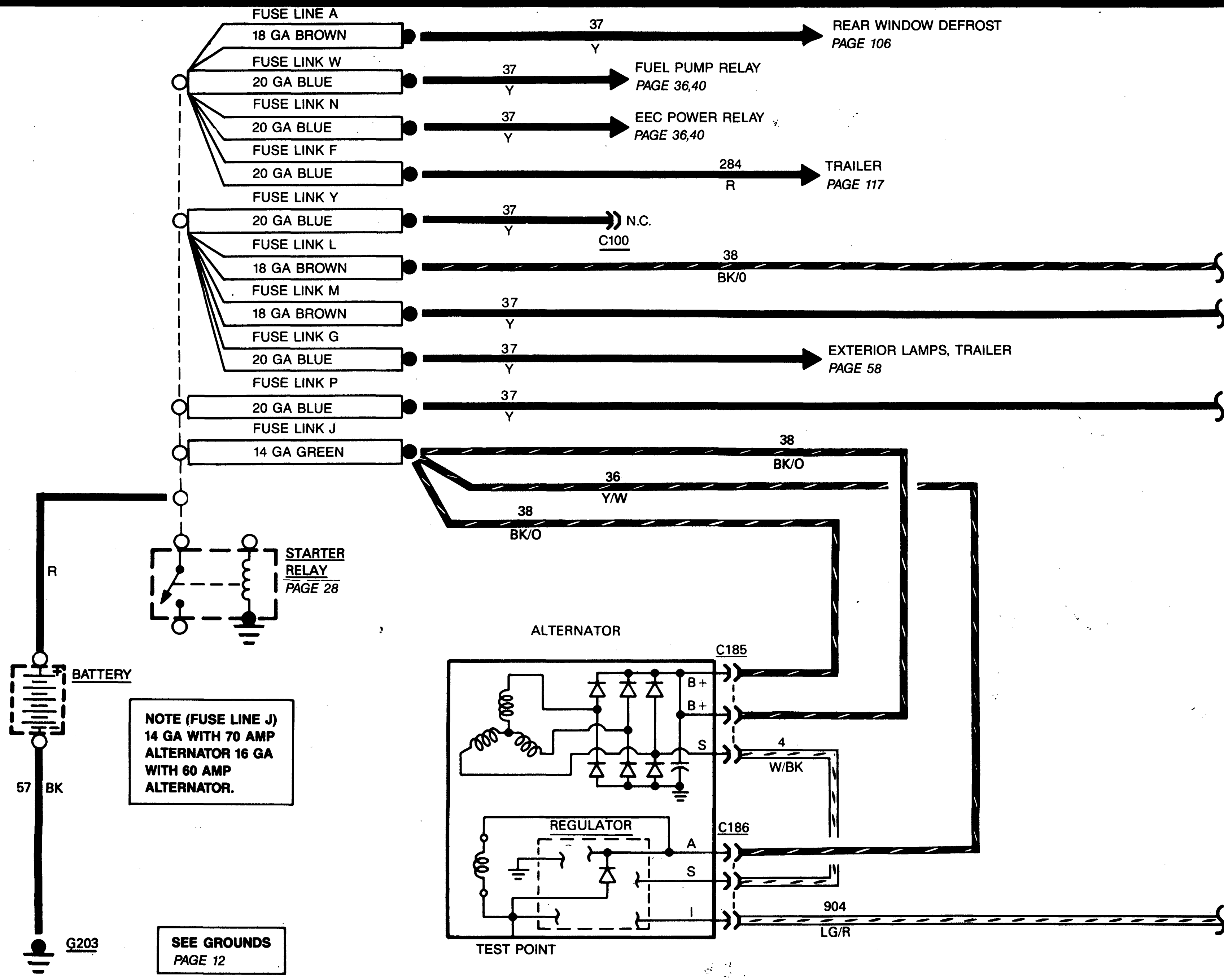
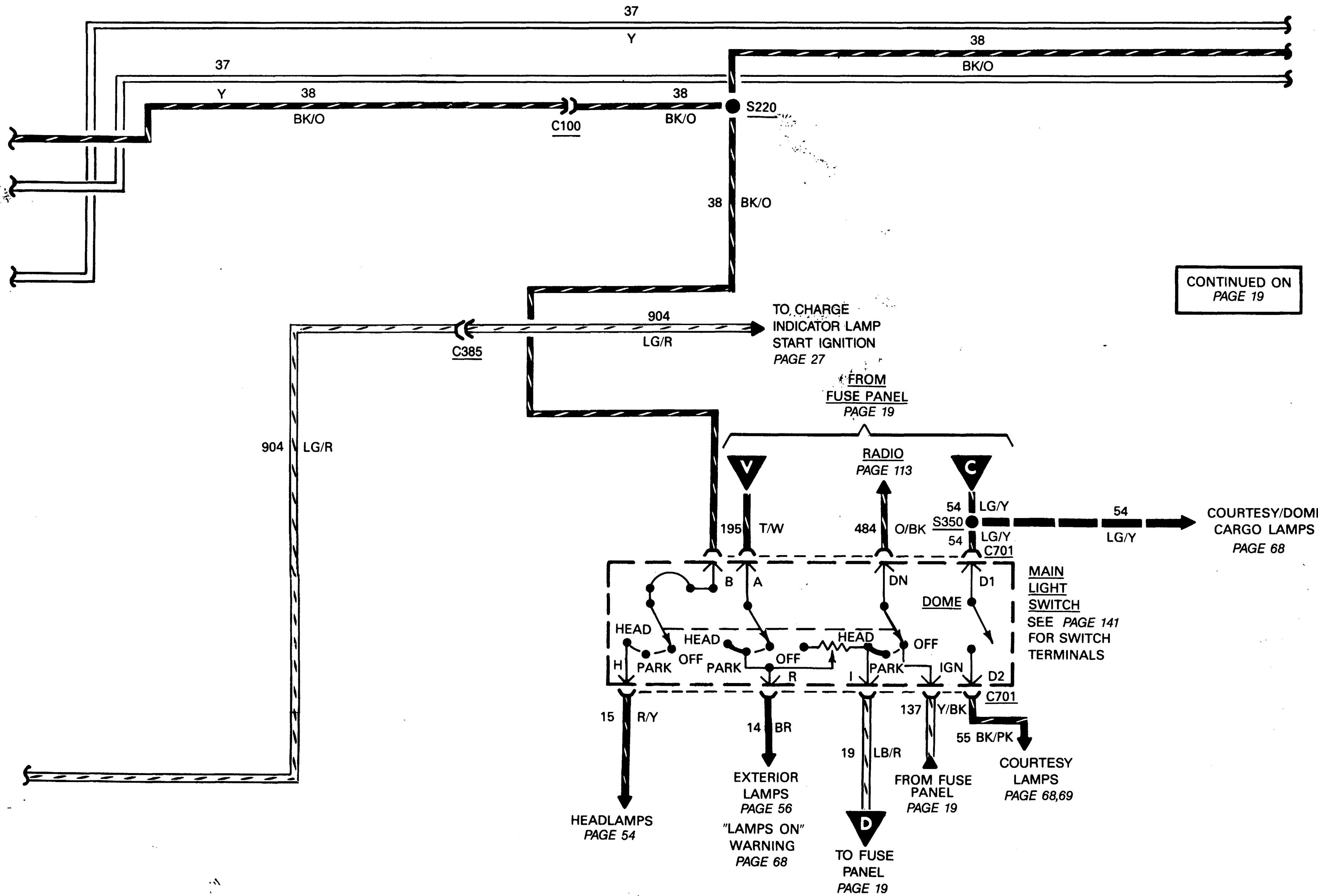
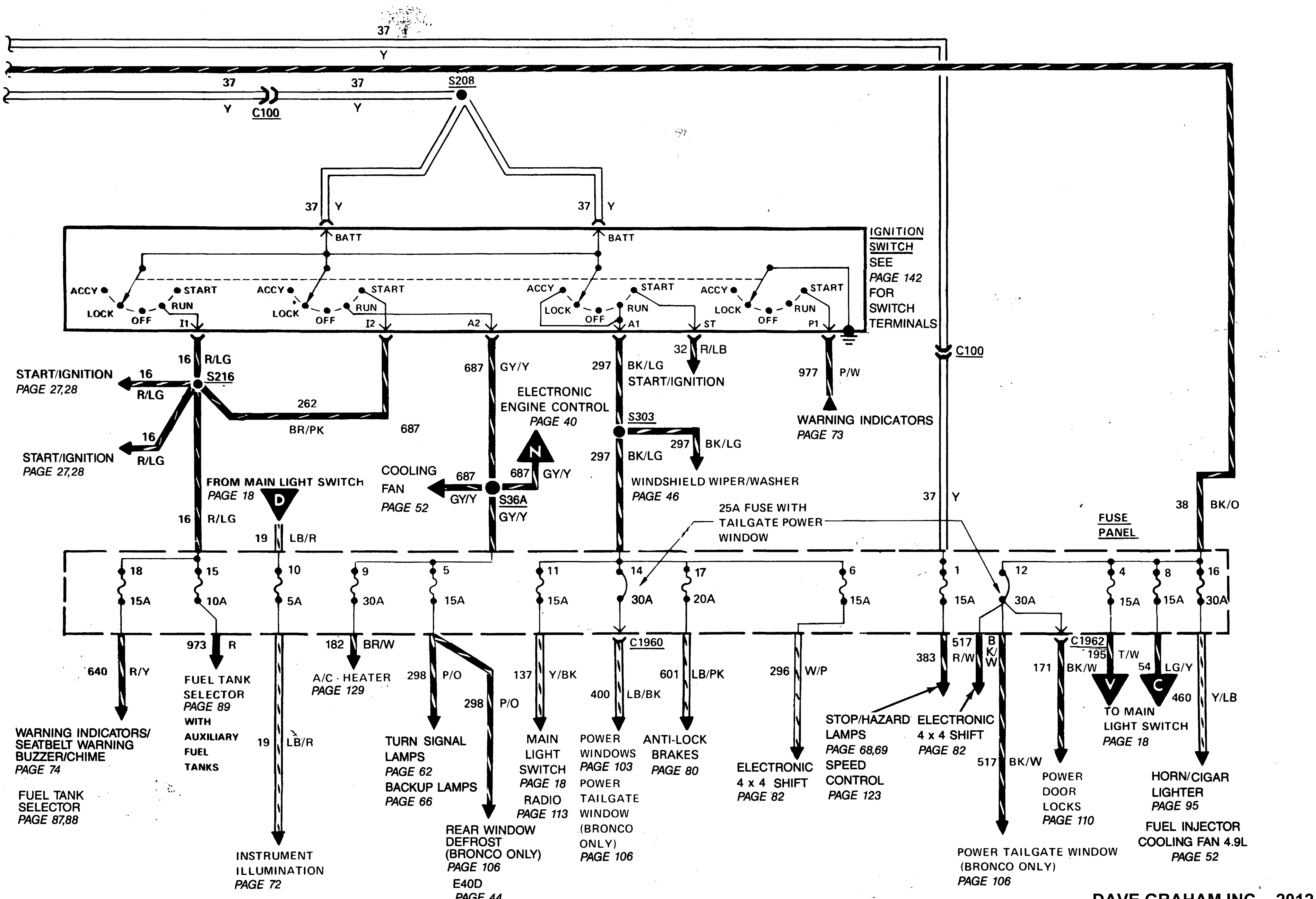


Figure 1 - Fuse Panel


FUSE LINE A
18 GA BROWN
37
Y
REAR WINDOW DEFROST
PAGE 106
FUSE LINK W
20 GA BLUE
FUEL PUMP RELAY
PAGE 36,40
FUSE LINK N
20 GA BLUE
EEC POWER RELAY
PAGE 36,40
FUSE LINK F
20 GA BLUE
284
R
TRAILER
PAGE 117
FUSE LINK Y
20 GA BLUE
N.C.
C100
FUSE LINK L
18 GA BROWN
38
BK/O
FUSE LINK M
18 GA BROWN
FUSE LINK G
20 GA BLUE
EXTERIOR LAMPS, TRAILER
PAGE 58
FUSE LINK P
20 GA BLUE
FUSE LINK J
14 GA GREEN
36
Y/W
STARTER RELAY
PAGE 28
R
BATTERY
57 BK
G203
NOTE (FUSE LINE J) 14 GA WITH 70 AMP ALTERNATOR 16 GA WITH 60 AMP ALTERNATOR.
SEE GROUNDS PAGE 12
ALTERNATOR
C185
B+
B+
S
4
W/BK
REGULATOR
C186
A
S
I
904
LG/R
TEST POINT



37
Y
38
BK/O
37
Y
38
BK/O
C100
38
BK/O
S220
38
BK/O
CONTINUED ON
PAGE 19
904
LG/R
C385
TO CHARGE
INDICATOR LAMP
START IGNITION
PAGE 27
FROM
FUSE PANEL
PAGE 19
904
LG/R
RADIO
PAGE 113
V
C
195
T/W
484
O/BK
54
LG/Y
S350
54
LG/Y
C701
54
LG/Y
COURTESY/DOME
CARGO LAMPS
PAGE 68
B
A
DN
D1
DOME
MAIN
LIGHT
SWITCH
SEE PAGE 141
FOR SWITCH
TERMINALS
HEAD
HEAD
HEAD
OFF
H
PARK
OFF
PARK
OFF
R
I
PARK
IGN
D2
C701
15
R/Y
14
BR
19
LB/R
137
Y/BK
55 BK/PK
HEADLAMPS
PAGE 54
EXTERIOR
LAMPS
PAGE 56
"LAMPS ON"
WARNING
PAGE 68
D
TO FUSE
PANEL
PAGE 19
FROM FUSE
PANEL
PAGE 19
COURTESY
LAMPS
PAGE 68,69



37 Y
37 Y C100
37 Y S208
37 Y
37 Y
BATT
BATT
IGNITION SWITCH SEE PAGE 142 FOR SWITCH TERMINALS
ACCY LOCK OFF RUN START I1
ACCY LOCK OFF RUN START I2 A2
ACCY LOCK OFF RUN START A1 ST
ACCY LOCK OFF RUN START P1
C100
16 R/LG S216
START/IGNITION PAGE 27,28
16 R/LG
262 BR/PK
687
16 R/LG
START/IGNITION PAGE 27,28
687 GY/Y
ELECTRONIC ENGINE CONTROL PAGE 40
N
687 GY/Y
COOLING FAN PAGE 52
687 GY/Y S36A GY/Y
297 BK/LG START/IGNITION
S303
297 BK/LG
297 BK/LG
WINDSHIELD WIPER/WASHER PAGE 46
32 R/LB
977 P/W
WARNING INDICATORS PAGE 73
FROM MAIN LIGHT SWITCH PAGE 18
D
16 R/LG
19 LB/R
25A FUSE WITH TAILGATE POWER WINDOW
37 Y
38 BK/O
FUSE PANEL
18 15A
15 10A
10 5A
9 30A
5 15A
11 15A
14 30A
17 20A
6 15A
1 15A
12 30A
4 15A
8 15A
16 30A
640 R/Y
WARNING INDICATORS/ SEATBELT WARNING BUZZER/CHIME PAGE 74
FUEL TANK SELECTOR PAGE 87,88
973 R
FUEL TANK SELECTOR PAGE 89 WITH AUXILIARY FUEL TANKS
19 LB/R
INSTRUMENT ILLUMINATION PAGE 72
182 BR/W
A/C - HEATER PAGE 129
298 P/O
298 P/O
TURN SIGNAL LAMPS PAGE 62
BACKUP LAMPS PAGE 66
REAR WINDOW DEFROST (BRONCO ONLY) PAGE 106
E40D PAGE 44
137 Y/BK
MAIN LIGHT SWITCH PAGE 18
RADIO PAGE 113
400 LB/BK C1960
POWER WINDOWS PAGE 103
POWER TAILGATE WINDOW (BRONCO ONLY) PAGE 106
601 LB/PK
ANTI-LOCK BRAKES PAGE 80
296 W/P
ELECTRONIC 4 x 4 SHIFT PAGE 82
383
517 R/W
B K/ W
STOP/HAZARD LAMPS PAGE 68,69
SPEED CONTROL PAGE 123
ELECTRONIC 4 x 4 SHIFT PAGE 82
517 BK/W
POWER TAILGATE WINDOW (BRONCO ONLY) PAGE 106
C1962
171 BK/W
POWER DOOR LOCKS PAGE 110
195 T/W
V
54 LG/Y
C
TO MAIN LIGHT SWITCH PAGE 18
460 Y/LB
HORN/CIGAR LIGHTER PAGE 95
FUEL INJECTOR COOLING FAN 4.9L PAGE 52

HOW THE CIRCUIT WORKS

The **Battery, Alternator** and **Voltage Regulator** make up the **Charging System.** With the **Ignition Switch** in RUN, **Battery** voltage is applied through the solid-state electronic control of the **Voltage Regulator.** The electronic control applies **Battery** voltage to the **Alternator** field.

With current in the field and the rotor turning, the **Alternator** stator produces a DC voltage at B+ terminals (to **Battery**). If the **Alternator** output voltage is greater than the **Battery** terminal voltage, current will flow from the **Alternator** to the **Battery,** as well as to the vehicle electrical load.

If the **Alternator** voltage is less than the **Battery** terminal voltage, current will flow from the **Battery** to supplement the alternator output in supplying the vehicle electrical load.

COMPONENT LOCATION

		Page-Figure
Fuse Links A,F,G,J,L,P, M, N, Y, W	Near starter relay	—
Radio Noise Capacitor	Attached to voltage regulator	—
Starter Relay	On RH fender apron	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

Refer to section 31-01 of the shop manual.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Improper Charging	• Loose/worn alternator belt • Defective/dead battery • Fuse Link J open at starter relay • Poor connection between battery terminals and cable clamps/ damaged cables	• Tighten/replace • Replace battery • Visually check for open in link, replace • Clean, tighten and/or replace
• Alternator Warning Indicator remains on after initial start up	• Poor connection on Alternator, Regulator, Starter Relay and/or Alternator Output Control Relay	• Make sure connections are clean and tight and refer to shop manual section 31-01, Charging System Diagnosis

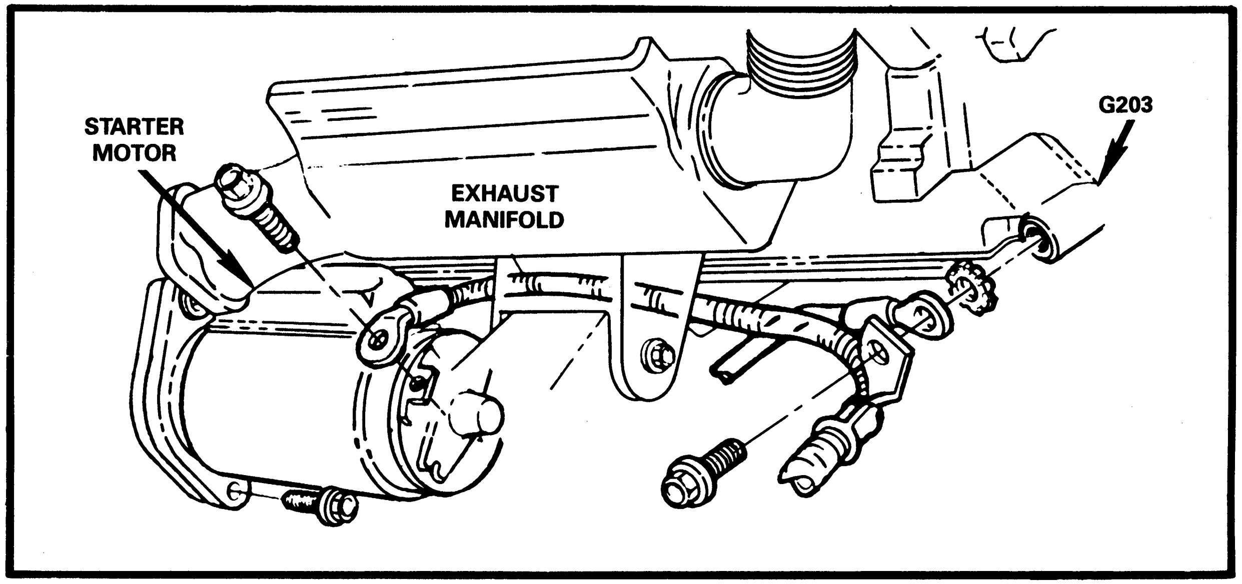


Figure 1 — Lower RH Side of Engine (5.0L, 5.8L, 7.5L, 8 Cyl.)

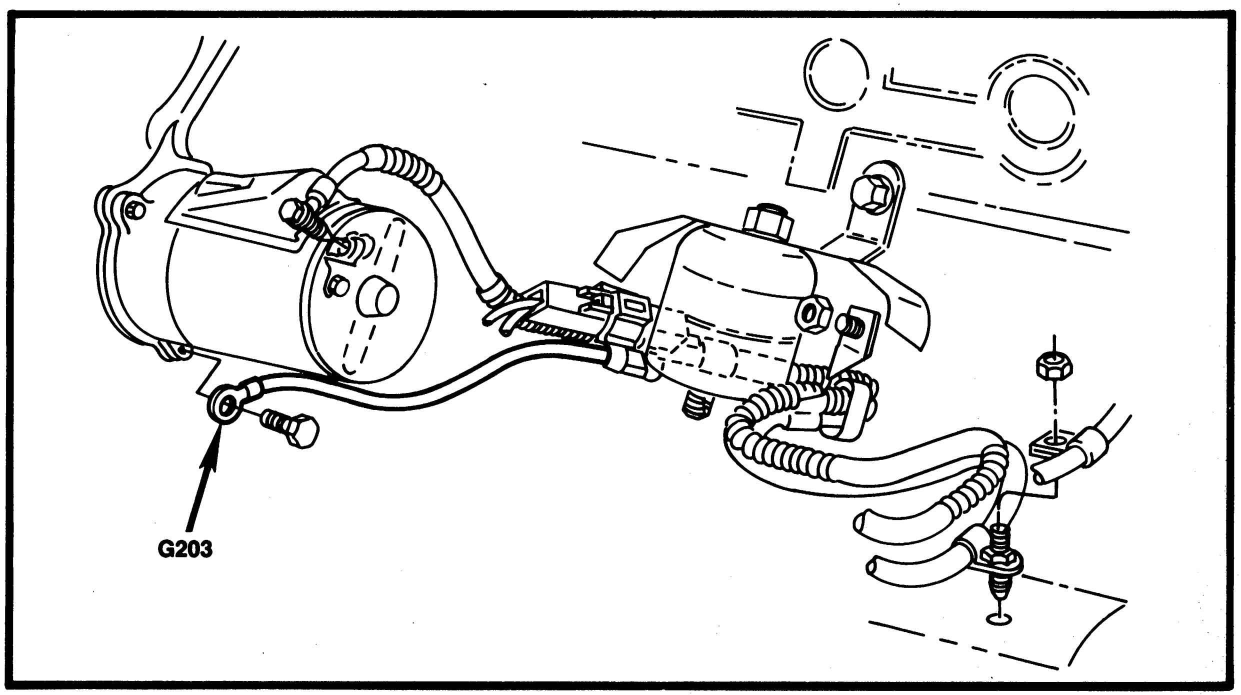
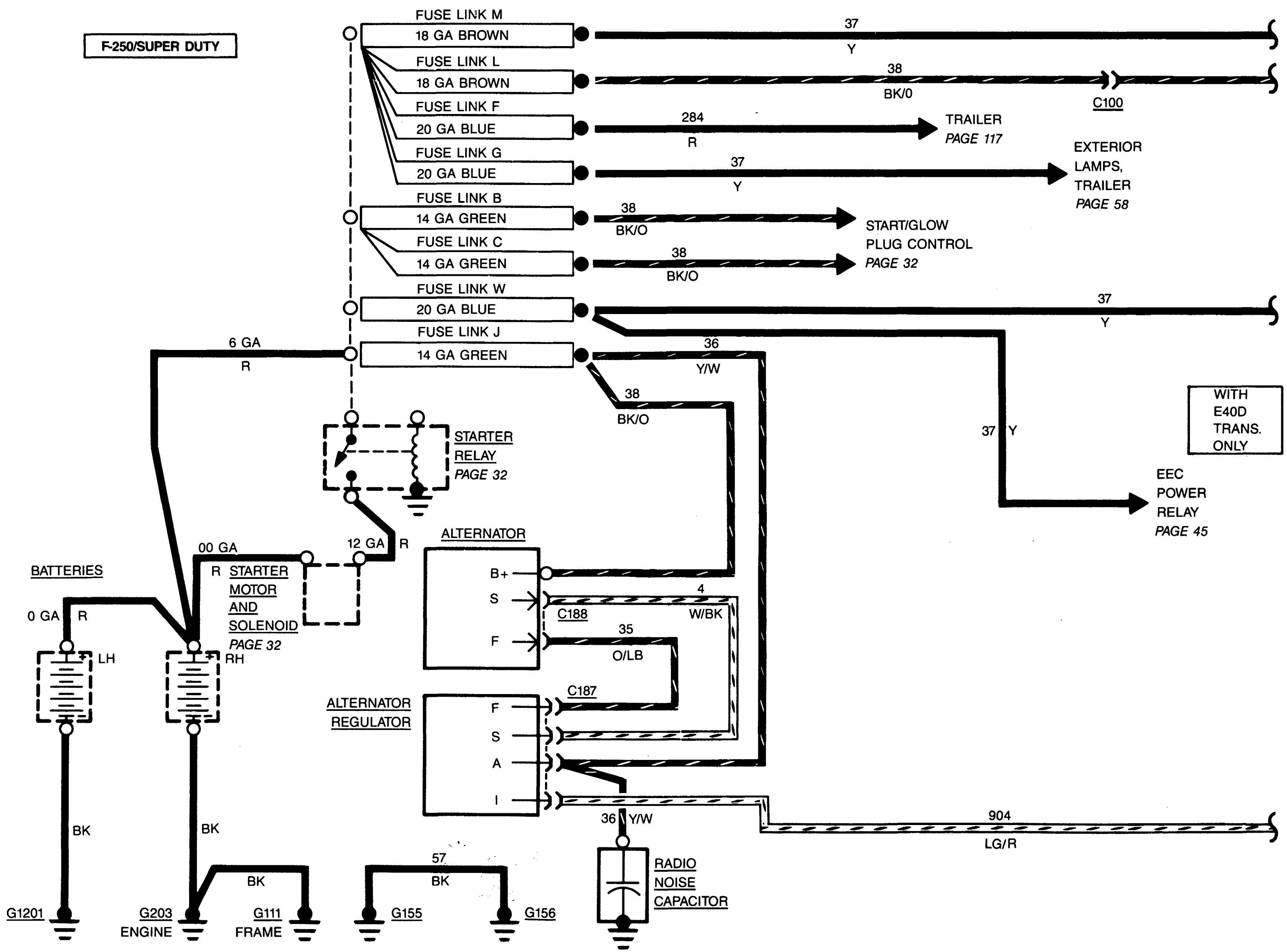
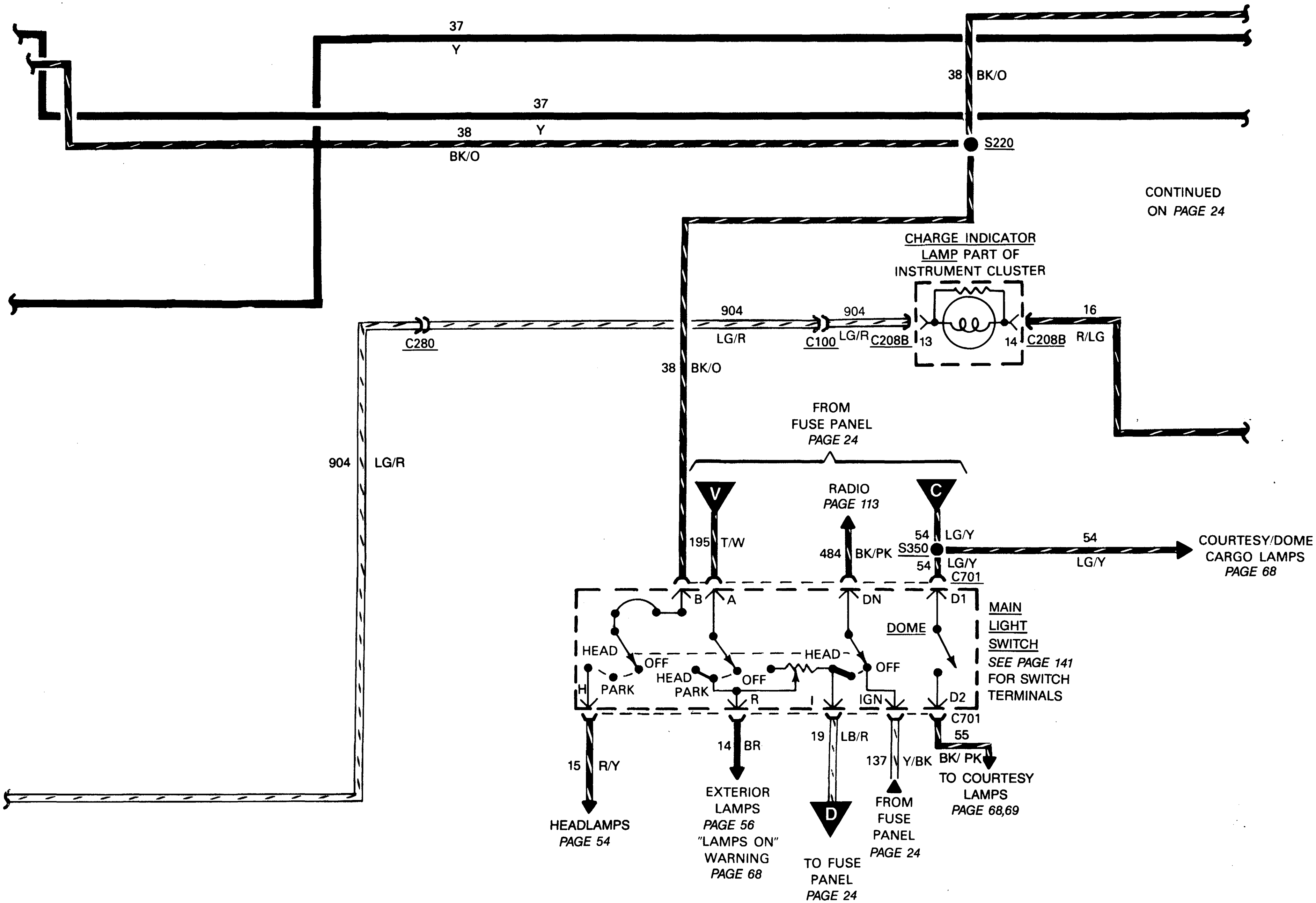
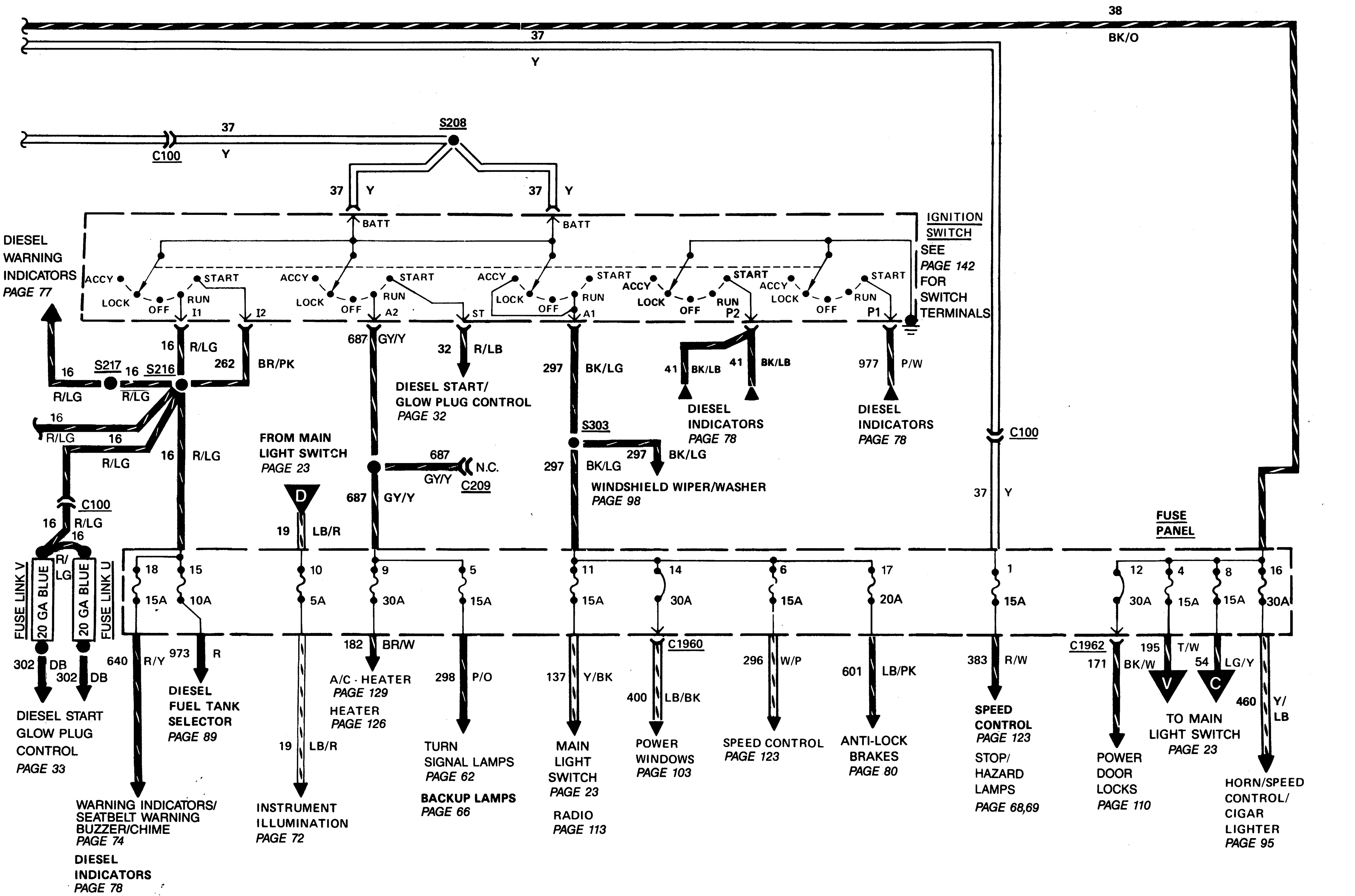


Figure 2 — Lower RH Side of Engine (4.9L 6 Cyl. ONLY)



F-250/SUPER DUTY
FUSE LINK M
18 GA BROWN
37
Y
FUSE LINK L
18 GA BROWN
38
BK/0
C100
FUSE LINK F
20 GA BLUE
284
R
TRAILER
PAGE 117
FUSE LINK G
20 GA BLUE
37
Y
EXTERIOR LAMPS, TRAILER
PAGE 58
FUSE LINK B
14 GA GREEN
38
BK/O
START/GLOW PLUG CONTROL
PAGE 32
FUSE LINK C
14 GA GREEN
38
BK/O
FUSE LINK W
20 GA BLUE
37
Y
FUSE LINK J
14 GA GREEN
6 GA
R
36
Y/W
38
BK/O
WITH E40D TRANS. ONLY
37 Y
EEC POWER RELAY
PAGE 45
STARTER RELAY
PAGE 32
12 GA
R
ALTERNATOR
B+
S
F
4
W/BK
C188
35
O/LB
00 GA
R
STARTER MOTOR AND SOLENOID
PAGE 32
BATTERIES
0 GA
R
LH
RH
ALTERNATOR REGULATOR
C187
F
S
A
I
36 Y/W
904
LG/R
RADIO NOISE CAPACITOR
BK
BK
57
BK
BK
G1201
G203
ENGINE
G111
FRAME
G155
G156


37
Y
38
BK/O
S220
CONTINUED ON PAGE 24
CHARGE INDICATOR LAMP PART OF INSTRUMENT CLUSTER
904
LG/R
C280
C100
C208B
13
14
16
R/LG
FROM FUSE PANEL PAGE 24
V
RADIO PAGE 113
C
195
T/W
484
BK/PK
54
LG/Y
S350
C701
COURTESY/DOME CARGO LAMPS PAGE 68
B
A
DN
D1
DOME
MAIN LIGHT SWITCH
SEE PAGE 141 FOR SWITCH TERMINALS
HEAD
OFF
PARK
H
R
IGN
D2
15
R/Y
14
BR
19
LB/R
137
Y/BK
55
BK/ PK
HEADLAMPS PAGE 54
EXTERIOR LAMPS PAGE 56 "LAMPS ON" WARNING PAGE 68
D
TO FUSE PANEL PAGE 24
FROM FUSE PANEL PAGE 24
TO COURTESY LAMPS PAGE 68,69



38
BK/O
37
Y
37
Y
S208
C100
37 Y
37 Y
IGNITION SWITCH
SEE PAGE 142 FOR SWITCH TERMINALS
BATT
BATT
ACCY
LOCK
OFF
RUN
START
I1
I2
A2
ST
A1
P2
P1
DIESEL WARNING INDICATORS PAGE 77
16 R/LG
262 BR/PK
S217
S216
687 GY/Y
32 R/LB
DIESEL START/ GLOW PLUG CONTROL PAGE 32
297 BK/LG
41 BK/LB
DIESEL INDICATORS PAGE 78
977 P/W
DIESEL INDICATORS PAGE 78
S303
297 BK/LG
WINDSHIELD WIPER/WASHER PAGE 98
FROM MAIN LIGHT SWITCH PAGE 23
D
19 LB/R
687 GY/Y
N.C.
C209
C100
37 Y
FUSE PANEL
FUSE LINK V
20 GA BLUE
FUSE LINK U
18 15A
15 10A
10 5A
9 30A
5 15A
11 15A
14 30A
6 15A
17 20A
1 15A
12 30A
4 15A
8 15A
16 30A
302 DB
DIESEL START GLOW PLUG CONTROL PAGE 33
640 R/Y
WARNING INDICATORS/ SEATBELT WARNING BUZZER/CHIME PAGE 74
DIESEL INDICATORS PAGE 78
973 R
DIESEL FUEL TANK SELECTOR PAGE 89
19 LB/R
INSTRUMENT ILLUMINATION PAGE 72
182 BR/W
A/C - HEATER PAGE 129
HEATER PAGE 126
298 P/O
TURN SIGNAL LAMPS PAGE 62
BACKUP LAMPS PAGE 66
137 Y/BK
MAIN LIGHT SWITCH PAGE 23
RADIO PAGE 113
C1960
400 LB/BK
POWER WINDOWS PAGE 103
296 W/P
SPEED CONTROL PAGE 123
601 LB/PK
ANTI-LOCK BRAKES PAGE 80
383 R/W
SPEED CONTROL PAGE 123
STOP/ HAZARD LAMPS PAGE 68,69
C1962
171 BK/W
POWER DOOR LOCKS PAGE 110
195 T/W
54 LG/Y
V
C
TO MAIN LIGHT SWITCH PAGE 23
460 Y/LB
HORN/SPEED CONTROL/ CIGAR LIGHTER PAGE 95

HOW THE CIRCUIT WORKS

The **Batteries, Alternator** and **Voltage Regulator** make up the **Diesel Charging System**.

With the **Ignition Switch** in RUN, **Battery** current flows through the solid-state Electronic Control of the **Voltage Regulator.** The Electronic Control applies **Battery** voltage to the **Alternator** field.

With current in the field and the rotor turning, the **Alternator** stator produces a DC voltage at B+ terminals (to **Battery**).

If the alternator output voltage is greater than the battery voltage, current will flow from the alternator to the Battery as well as to the vehicle electrical load.

If the alternator voltage is less than the battery voltage, current will flow from the battery to help supply the vehicle load.

COMPONENT LOCATION

Component	Location	Page-Figure
Charge Indicator	In instrument cluster	—
Fuse Links B, C, F, G, J, L, M, W	Near starter relay	—
Fuse Links U, V	RH fender apron	—
Radio Noise Capacitor	Near voltage regulator	—
Starter Relay	RH inner fender	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

Refer to section 31-01 of the shop manual.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Improper Charging	• Loose/worn alternator belt • Defective/dead battery • Fuse Link J open at starter relay • Poor connection between battery terminals and cable clamps/ damaged cables	• Tighten/replace • Replace battery • Visually check for open in link, replace • Clean, tighten and/or replace
• Alternator Warning Indicator remains on after initial start up	• Poor connection on Alternator, Regulator, Starter Relay and/or Alternator Output Control Relay	• Make sure connections are clean and tight and refer to shop manual section 31-01, Charging System Diagnosis

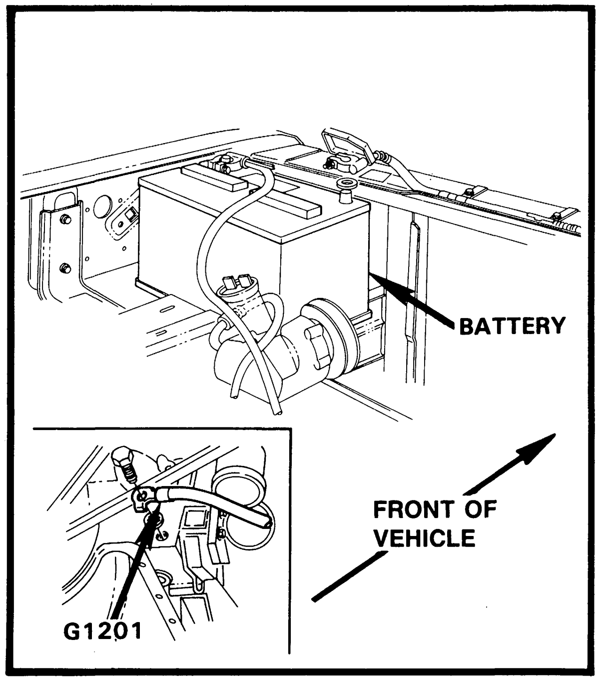


Figure 1—Battery Wiring LH Side (Diesel Engine)

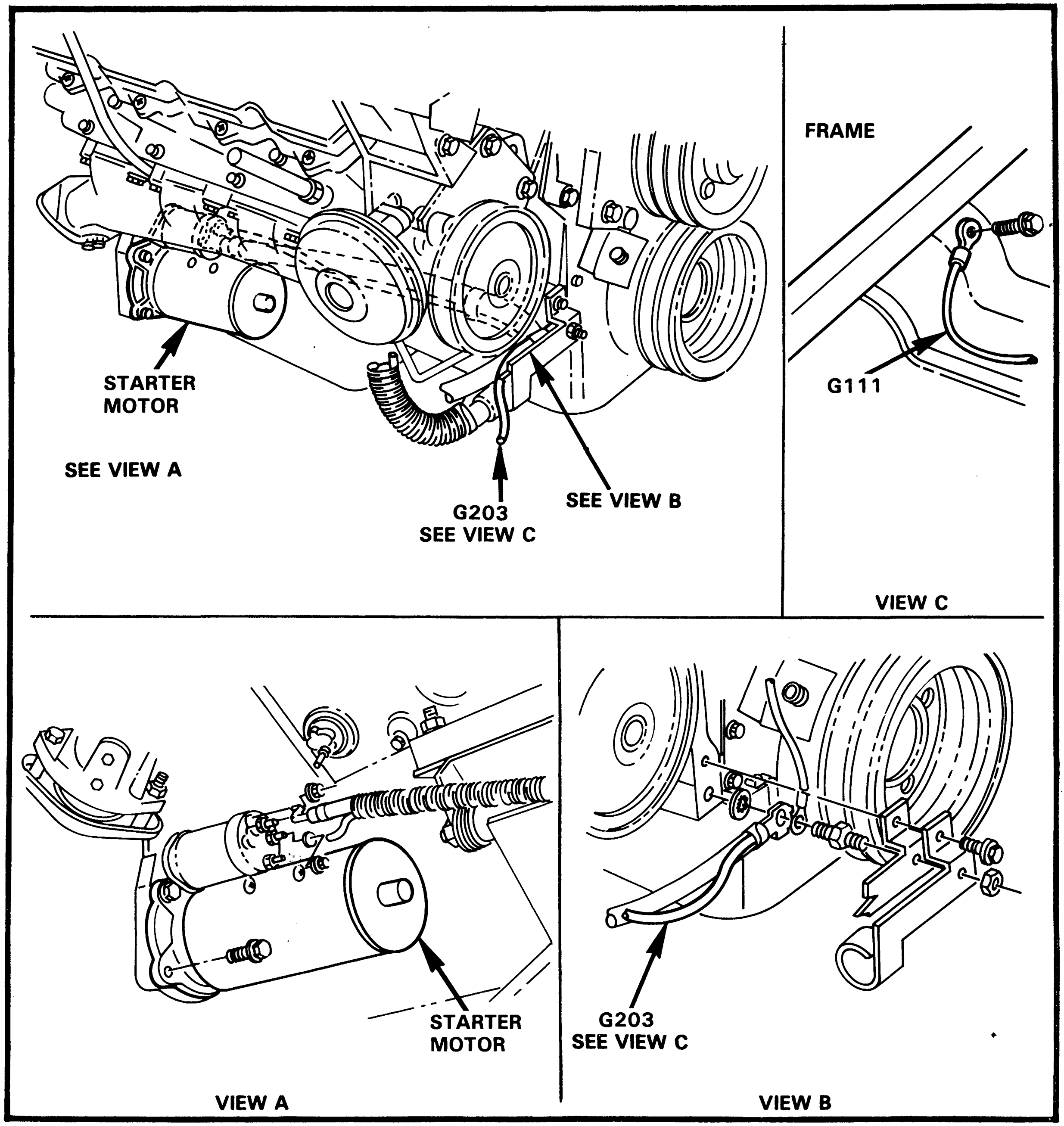
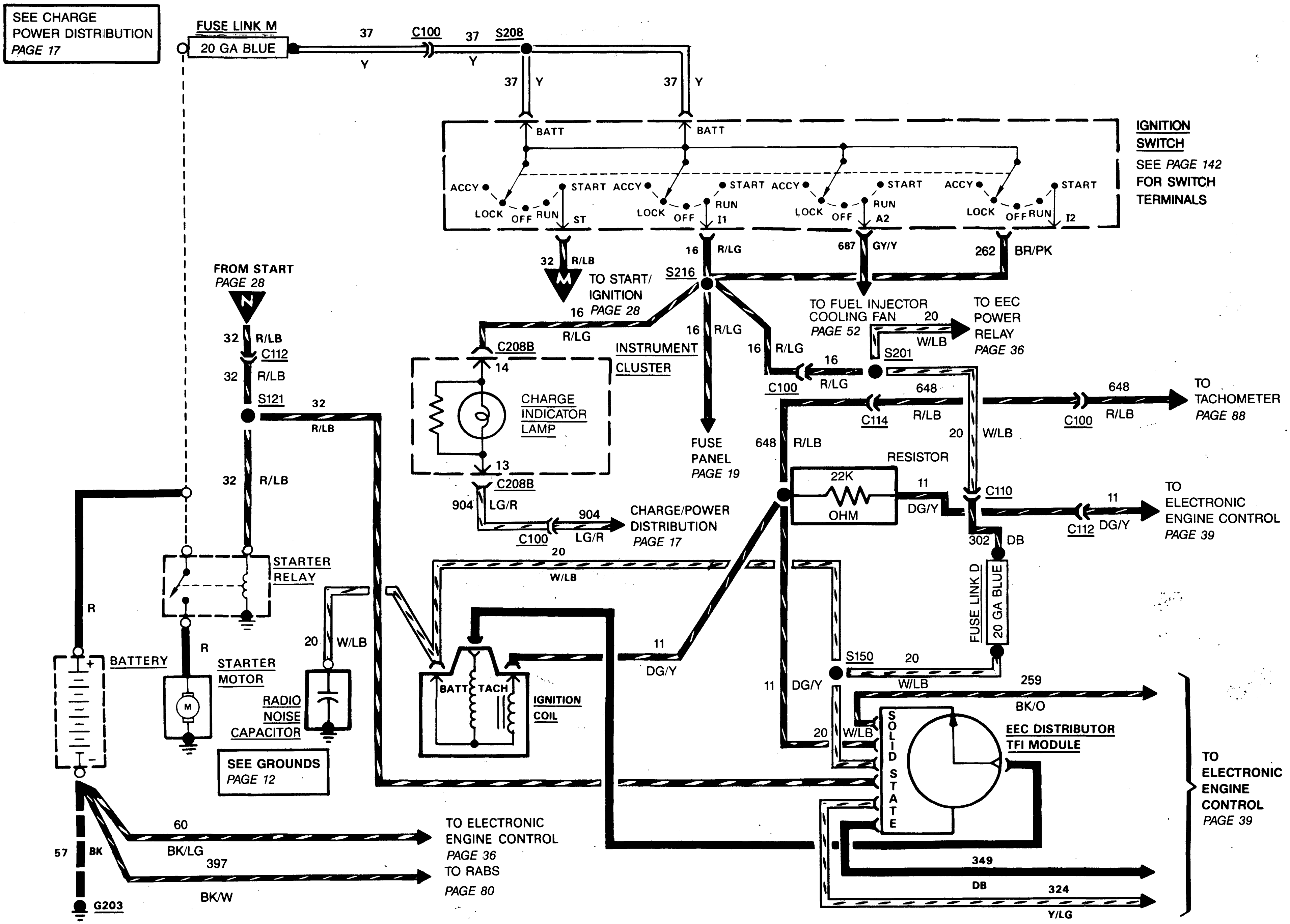
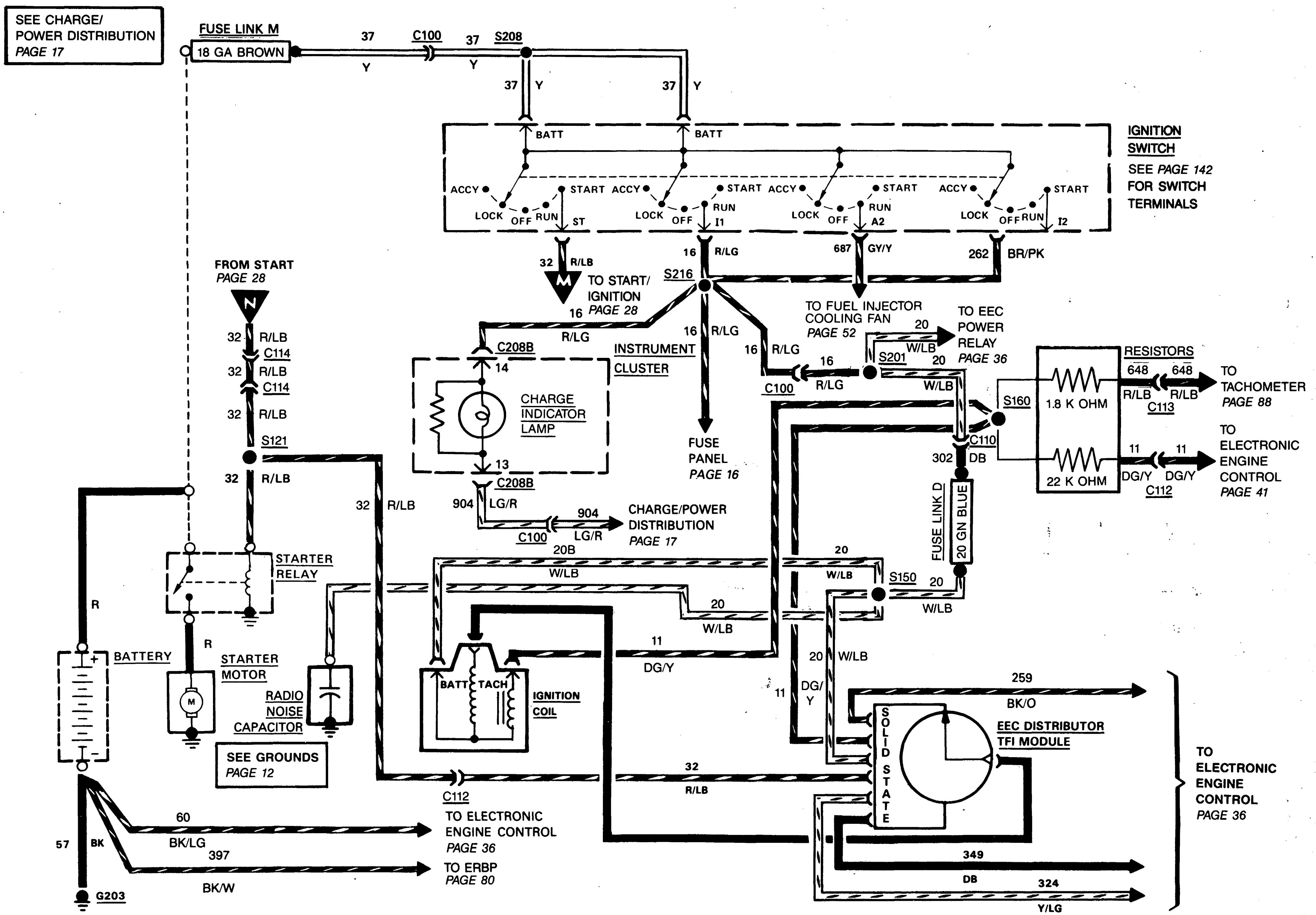


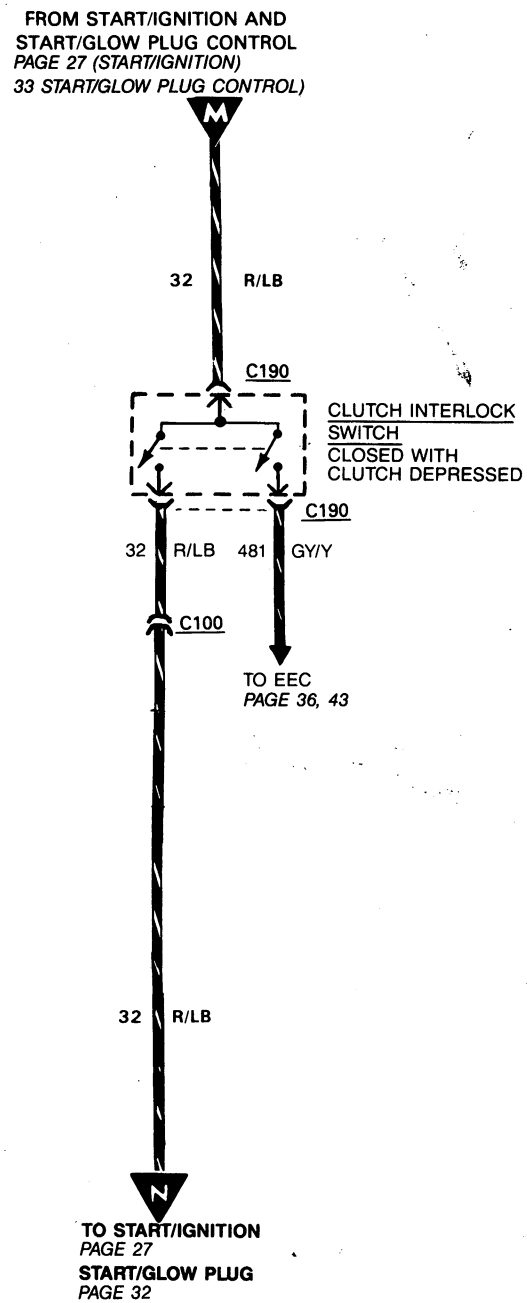
Figure 2—Starter Wiring (Diesel Engine)



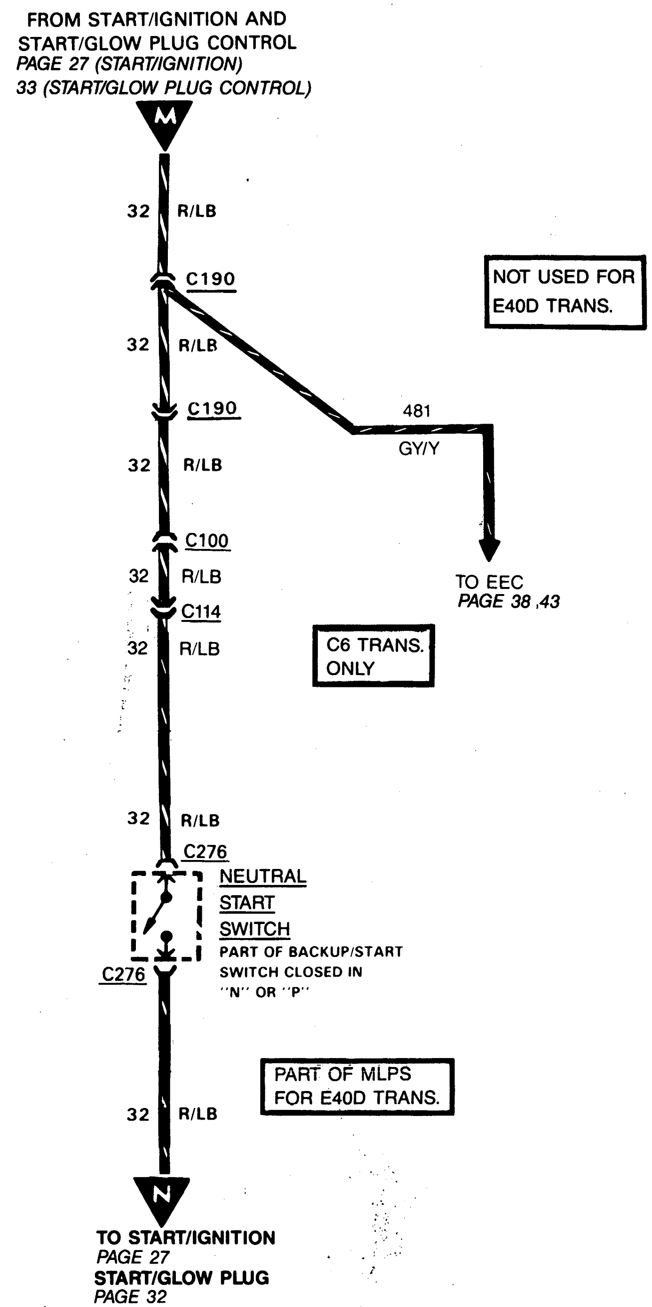
SEE CHARGE POWER DISTRIBUTION PAGE 17
FUSE LINK M
20 GA BLUE
37 Y
C100
S208
BATT
IGNITION SWITCH
SEE PAGE 142 FOR SWITCH TERMINALS
ACCY
START
LOCK
OFF
RUN
ST
I1
A2
I2
32 R/LB
16 R/LG
687 GY/Y
262 BR/PK
TO START/ IGNITION PAGE 28
S216
FROM START PAGE 28
C112
S121
C208B
INSTRUMENT CLUSTER
CHARGE INDICATOR LAMP
FUSE PANEL PAGE 19
TO FUEL INJECTOR COOLING FAN PAGE 52
TO EEC POWER RELAY PAGE 36
20 W/LB
S201
648 R/LB
C114
TO TACHOMETER PAGE 88
RESISTOR
22K OHM
11 DG/Y
C110
TO ELECTRONIC ENGINE CONTROL PAGE 39
904 LG/R
CHARGE/POWER DISTRIBUTION PAGE 17
302 DB
FUSE LINK D
20 GA BLUE
STARTER RELAY
R
BATTERY
STARTER MOTOR
RADIO NOISE CAPACITOR
SEE GROUNDS PAGE 12
BATT
TACH
IGNITION COIL
S150
259 BK/O
EEC DISTRIBUTOR TFI MODULE
SOLID STATE
TO ELECTRONIC ENGINE CONTROL PAGE 39
60 BK/LG
TO ELECTRONIC ENGINE CONTROL PAGE 36
397 BK/W
TO RABS PAGE 80
57 BK
G203
349 DB
324 Y/LG


SEE CHARGE/ POWER DISTRIBUTION PAGE 17
FUSE LINK M
18 GA BROWN
37 Y
C100
S208
BATT
ACCY
START
LOCK
OFF
RUN
ST
I1
A2
I2
IGNITION SWITCH
SEE PAGE 142 FOR SWITCH TERMINALS
32 R/LB
TO START/ IGNITION PAGE 28
16 R/LG
S216
687 GY/Y
262 BR/PK
FROM START PAGE 28
C114
S121
C208B
INSTRUMENT CLUSTER
CHARGE INDICATOR LAMP
904 LG/R
CHARGE/POWER DISTRIBUTION PAGE 17
FUSE PANEL PAGE 16
TO FUEL INJECTOR COOLING FAN PAGE 52
TO EEC POWER RELAY PAGE 36
20 W/LB
S201
RESISTORS
648 R/LB
1.8 K OHM
22 K OHM
C113
TO TACHOMETER PAGE 88
S160
C110
302 DB
FUSE LINK D
20 GN BLUE
11 DG/Y
C112
TO ELECTRONIC ENGINE CONTROL PAGE 41
STARTER RELAY
20B
S150
R
BATTERY
STARTER MOTOR
RADIO NOISE CAPACITOR
SEE GROUNDS PAGE 12
BATT
TACH
IGNITION COIL
259 BK/O
EEC DISTRIBUTOR TFI MODULE
SOLID STATE
TO ELECTRONIC ENGINE CONTROL PAGE 36
32 R/LB
349 DB
324 Y/LG
60 BK/LG
TO ELECTRONIC ENGINE CONTROL PAGE 36
397 BK/W
TO ERBP PAGE 80
57 BK
G203

WITH MANUAL TRANSMISSION



WITH AUTOMATIC TRANSMISSION



HOW THE CIRCUIT WORKS

START

The **Battery, Starter Motor, Starter Relay,** and **Ignition Switch** make up the **Starting System.** In vehicles with automatic transmissions, the **Neutral Safety Start Switch** must be closed **(Park** or **Neutral)** in order to operate the **Starter Motor.** In vehicles with manual transmissions, the **Clutch Interlock Switch** must be closed in order to operate the **Starter Motor.**

Turning the **Ignition Switch** to START sends battery voltage to the **Starter Relay** coil and energizes the relay. Voltage from the **Battery** is then applied directly through the **Starter Relay** to the **Starter Motor** to start the engine.

When the **Ignition Switch** is in START, battery voltage is applied to both the START (circuit 32) and RUN (circuit 20) terminals of the **Thick Film Integrated Ignition (TFI) Module.** When the **Ignition Switch** is in the RUN position, the voltage on circuit 32 drops to zero.

COMPONENT LOCATION

Component	Location	Page-Figure
Charge Indicator	Part of instrument cluster	—
Clutch Interlock Switch	Near top of clutch pedal	31-1
Fuse Link M	At starter relay	—
Fuse Link D	At C110 LH engine compartment	—
Ignition Coil	On engine	133-1, 136-4
Ignition Module	At distributor	133-1
Manual Lever Position Sensor	Part of E40D transmission	51-1
Neutral Safety Switch	Part of automatic transmission	—
Radio Noise Capacitor	At ignition coil	—
Starter Relay	RH inner fender	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Starter does not operate	• No voltage at starter Relay/Starter	• Check for open at Fuse Link M
• Starter cranks slowly/solenoid clicks	• Low charged battery/defective starter	• Check for clean tight connection at battery/worn battery or repair/replace starter
• Poor engine performance	• Engine operating with a fixed 10° BTDC spark timing and the EGR system is not operating	• System operating in "fail mode" *see EEC system note

***NOTE:** Because of the complexity of the EEC system, special test equipment is required to diagnose it. Refer to the ENGINE/EMISSIONS DIAGNOSIS MANUAL, VOLUME H for diagnostic procedures.

HOW THE CIRCUIT WORKS

IGNITION

The **EEC Distributor** does not have a magnetic pickup or spark advance. Instead all ignition timing is controlled by the **Electronic Engine Control (EEC) Module.** Refer to the Engine/Emissions Diagnosis Manual Volume H for complete details.

The **EEC IV Ignition System** includes a **Thick Film Integrated Ignition (TFI) Module,** which is mounted on the side of the **Distributor.**

- The pickup in the **Distributor** provides a signal input to the **EEC Module.** On the 4.9L, 5.0L and 5.8L this signal is provided through the **TFI Module.** On the 7.5L the signal is padded directly from the pickup to the **EEC Module.**

When the engine is running:

- The **EEC Module** then sends a signal to the **TFI Module** which switches current on and off in the primary circuit of the ignition coil according to the **EEC Module** signal.
- Each interruption of primary current makes the **Ignition Coil** secondary produce an open circuit high-voltage pulse of up to 40,000 volts.
- High voltage pulses are transmitted to the **Distruibtor,** which sends them to fire the spark plugs.

Two signal circuits (324 and 349) are connected between the **TFI Ignition Module** and the **Electronic Engine Control (EEC) Module.**

Refer to Engine/Emissions Diagnosis Manual, Volume H.

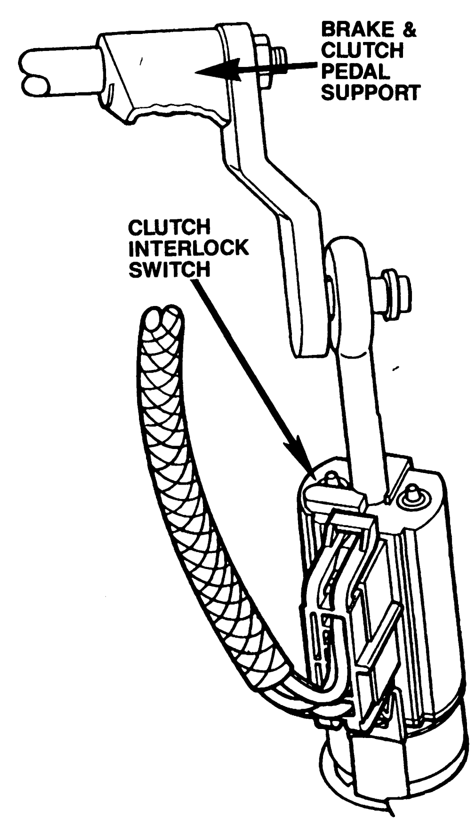
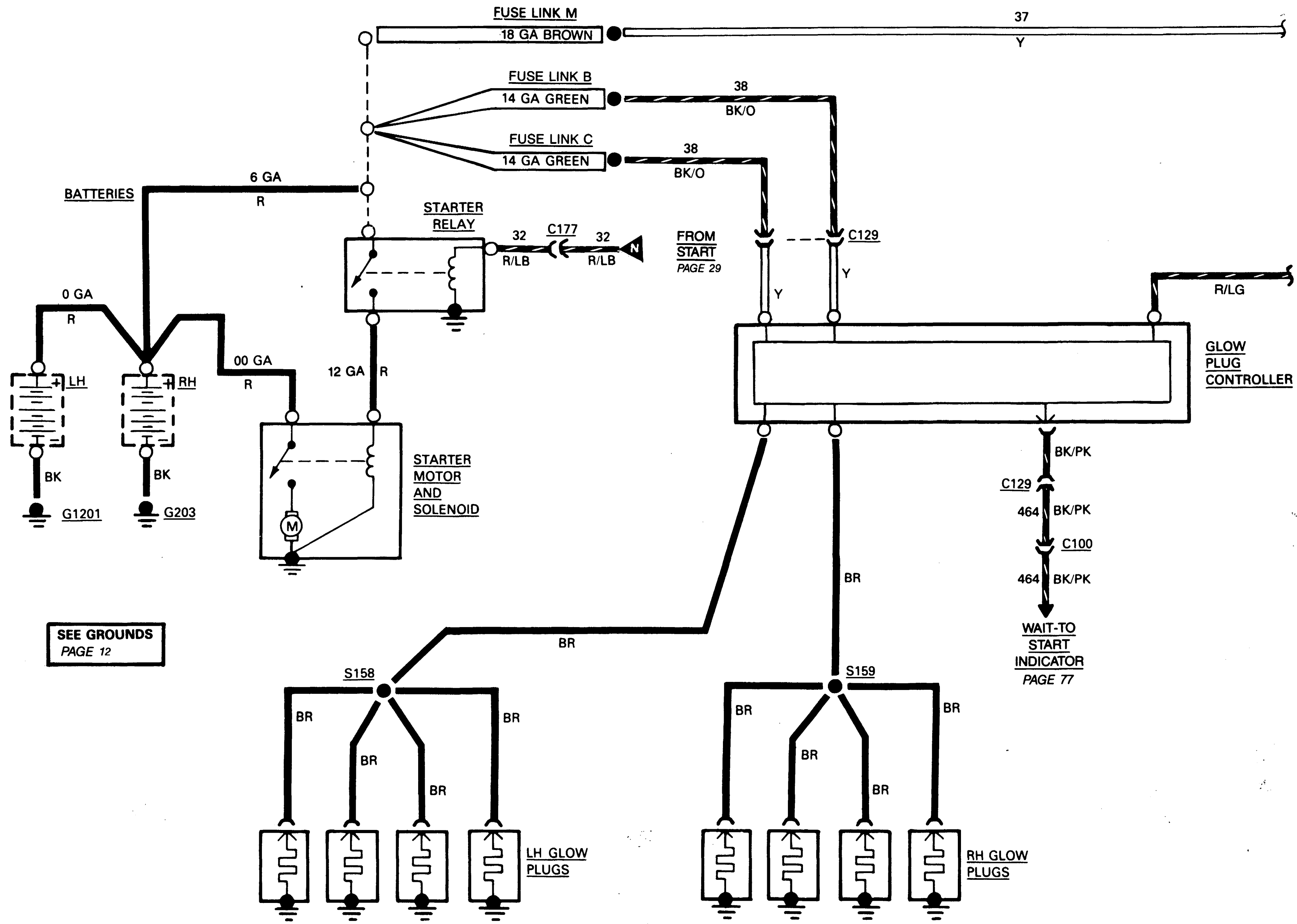
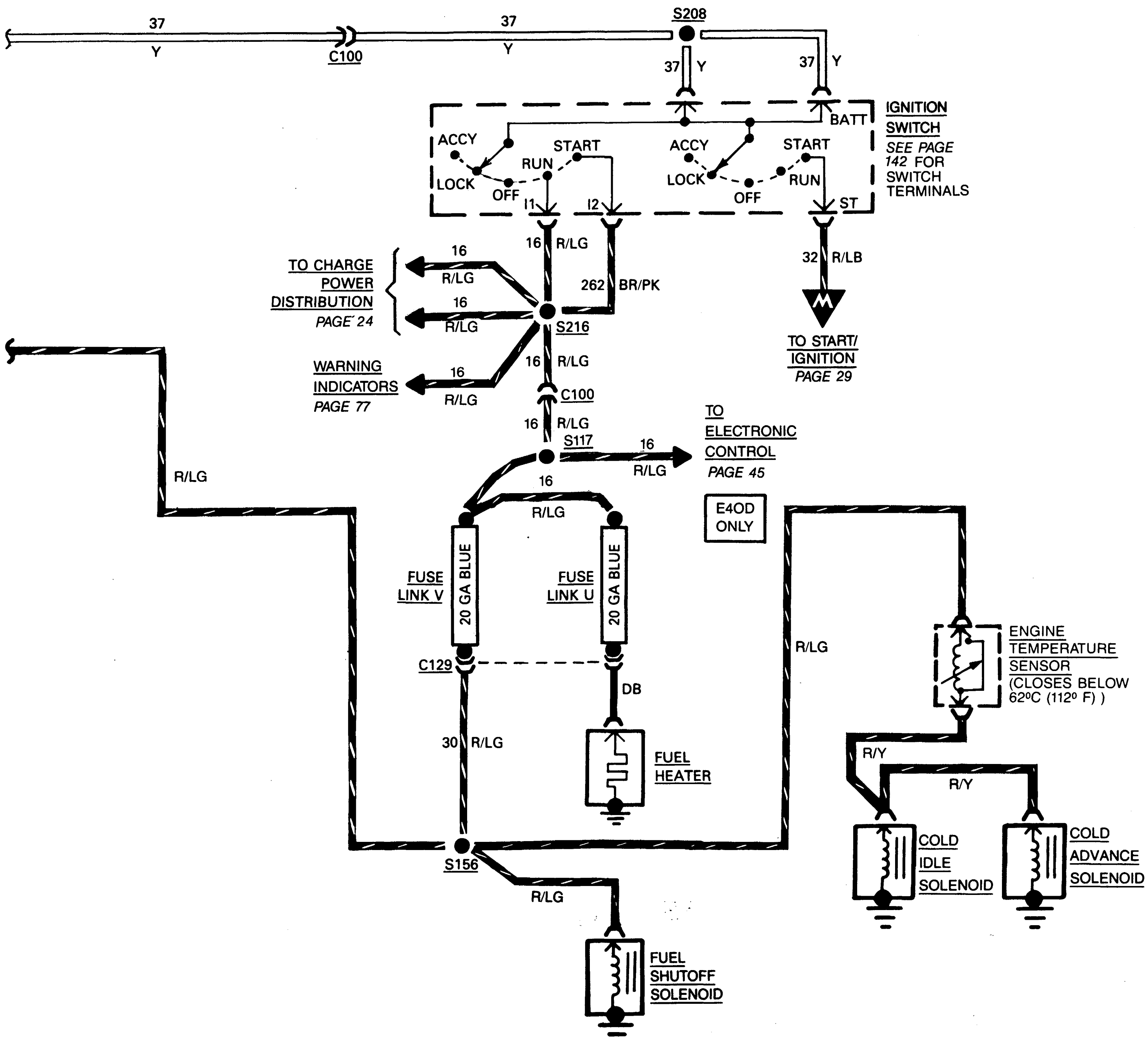


Figure 1 — Clutch Interlock Switch



FUSE LINK M
18 GA BROWN
37
Y
FUSE LINK B
14 GA GREEN
38
BK/O
FUSE LINK C
14 GA GREEN
38
BK/O
6 GA
R
BATTERIES
STARTER RELAY
32
C177
32
R/LB
R/LB
N
FROM START
PAGE 29
C129
Y
Y
R/LG
0 GA
R
00 GA
R
12 GA
R
LH
RH
BK
BK
G1201
G203
STARTER MOTOR AND SOLENOID
M
GLOW PLUG CONTROLLER
BK/PK
C129
464
BK/PK
C100
464
BK/PK
WAIT-TO START INDICATOR
PAGE 77
BR
BR
SEE GROUNDS
PAGE 12
S158
S159
BR
BR
BR
BR
BR
BR
BR
BR
LH GLOW PLUGS
RH GLOW PLUGS


37
Y
C100
37
Y
S208
37 Y
37 Y
IGNITION SWITCH
SEE PAGE 142 FOR SWITCH TERMINALS
BATT
ACCY
LOCK
OFF
RUN
START
I1
I2
ACCY
LOCK
OFF
START
RUN
ST
16 R/LG
262 BR/PK
32 R/LB
TO CHARGE POWER DISTRIBUTION
PAGE 24
16
R/LG
16
R/LG
S216
TO START/ IGNITION
PAGE 29
WARNING INDICATORS
PAGE 77
16
R/LG
16 R/LG
C100
16 R/LG
S117
16
R/LG
TO ELECTRONIC CONTROL
PAGE 45
16
R/LG
E4OD ONLY
R/LG
FUSE LINK V
20 GA BLUE
FUSE LINK U
20 GA BLUE
C129
DB
30 R/LG
FUEL HEATER
R/LG
ENGINE TEMPERATURE SENSOR
(CLOSES BELOW 62°C (112° F))
R/Y
R/Y
COLD IDLE SOLENOID
COLD ADVANCE SOLENOID
S156
R/LG
FUEL SHUTOFF SOLENOID

HOW THE CIRCUIT WORKS

The Diesel Start/Glow Plug Control circuit applies power to the **Glow Plugs** which heat the combustion chambers, so that the cold diesel engine can be started.

Glow Plug Control

The solid state **Glow Plug Controller** is attached to the top of the engine block. It maintains glow plug pre-glow and after-glow time. The **Glow Plug Controller** controls the circuit's operation by sensing engine temperature, glow plug voltage, and after-glow voltage from start/run circuit.

When the **Ignition Switch** is turned to RUN, voltage from **Fuse Link V** is applied through the **Glow Plug Controller** to the **Glow Plugs Wait to Start Indicator Lamp.**

The glow plugs are heated from zero to fifteen seconds, depending on engine coolant temperature. After this time, the controller cycling switch opens and turns OFF the **Glow Plugs Wait to Start Indicator Lamp.**

The **Glow Plugs** are now warm enough for the engine to be started.

At the same time the **Ignition Switch** is turned to Run, voltage from **Fuse Link V** is applied to the After-Glow Timer (located inside the Glow Plug Controller). The After-Glow Timer cycles the **Glow Plugs** for up to two minutes, depending on engine temperature. The After-Glow Timer then opens. The **Wait to Start Indicator Lamp** will not light during After-Glow period.

If the ignition switch is turned **OFF,** it can be turned **ON** immediately and the **Glow Plug** heating cycle will start again.

Diesel Start/Run

The diesel engine uses two batteries to provide extra power for starting and glow plug heating. Power is applied from the batteries through heavy gauge wires to the Starter Solenoid in the Starter motor assembly. When the **Glow Plug Indicator** goes out, the **Ignition Switch** can be turned to START. With the transmission selector in park or neutral (automatic transmission), or the clutch pedal depressed (manual transmission), power is applied to the **Starter Relay.** The relay applies power to the solenoid coil which closes contacts to apply battery power to the starter motor.

With the **Ignition Switch** in Start or Run, voltage is supplied to the **Fuel Line Heater, Fuel Shut-Off Solenoid,** and the **Engine Temperature Switch** through **Fuse Links U and V.**

The **Fuel Heater/Water Separator** heats the diesel fuel to melt any wax which might clog filter.

The **Fuel Shut-Off Solenoid** controls the flow of fuel into the Injection Pump. With the **Ignition Switch** in Start or Run, the solenoid is energized, and fuel is allowed to flow into the Injection Pump. When the **Ignition Switch** is turned to Off, the solenoid is de-energized, fuel flow stops, and the engine stops running.

The **Engine Temperature Switch** provides ltage to the **Cold Advance Solenoid** and the **Cold Idle Solenoid.** When engine temperature is below 62°C (112°F) the **Engine Temperature Switch** is closed. When the **Ignition Switch** is turned to Start or Run, the Solenoids are energized, advancing Injection Pump timing and Engine Idle, allowing the engine to run more smoothly when cold. When the engine temperature reaches 62°C (112°F), the **Engine Temperature Switch** opens. This de-energizes the Solenoids, returning the Timing and Idle to normal.

Refer to Engine/Emissions Diagnosis Manual, volume H for additional diagnosis information.

COMPONENT LOCATION

Component	Location	Page-Figure
Cold Advance Solenoid	In injection pump	—
Cold Idle Solenoid	On injection pump	—
Engine Temperature Switch	At left front end of engine	—
Fuel Heater	RH side of engine	—
Fuel Shut-Off Solenoid	In injection pump	—
Fuse Link B, C, M	Near starter relay	—
Fuse Link U, V	RH fender apron	—
Glow Plug Controller	LH rear top of engine	35-1
Glow Plug Indicator	In diesel warning lamp module	—
Starter Relay	RH fender	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• No Glow Plugs operate	• No voltage at Y wire connector of Glow Plug Controller	• Check Fuse Links B and C and check wiring
• One Glow Plug does not operate	• No voltage at BR wire of Glow Plug	• Check for open in BR wire

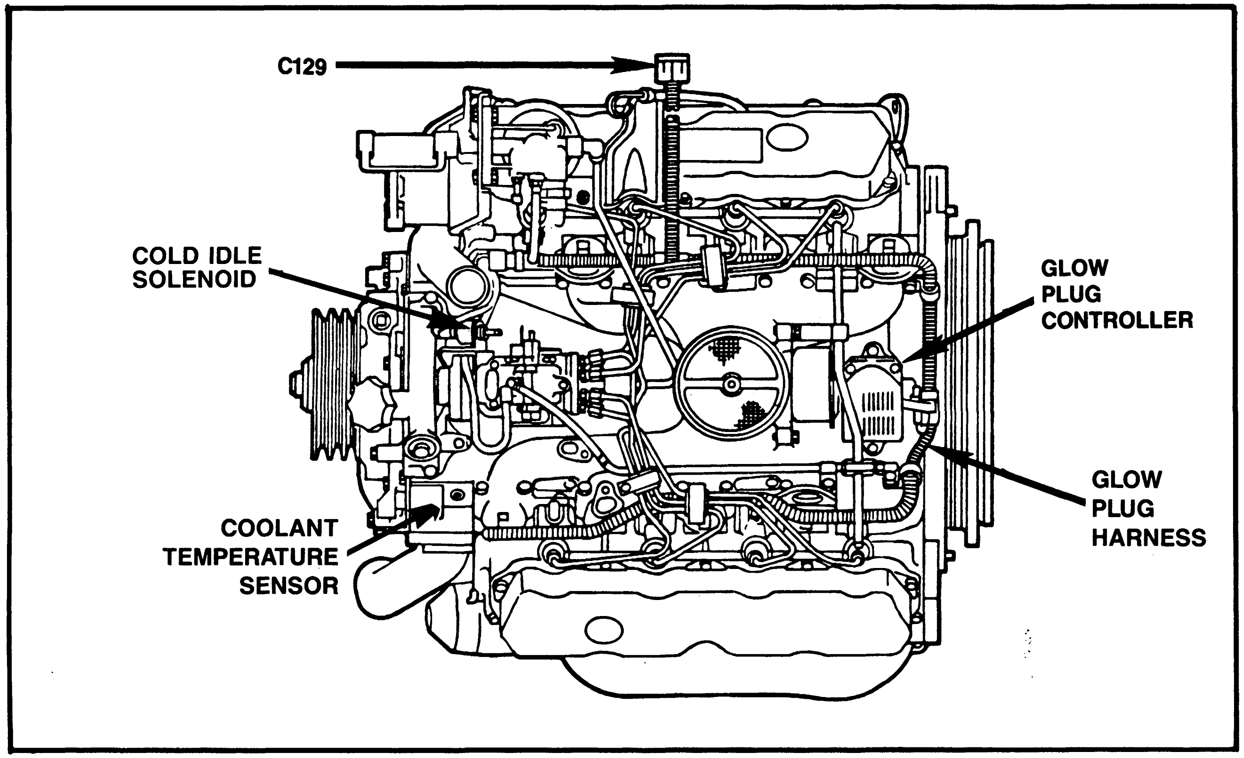
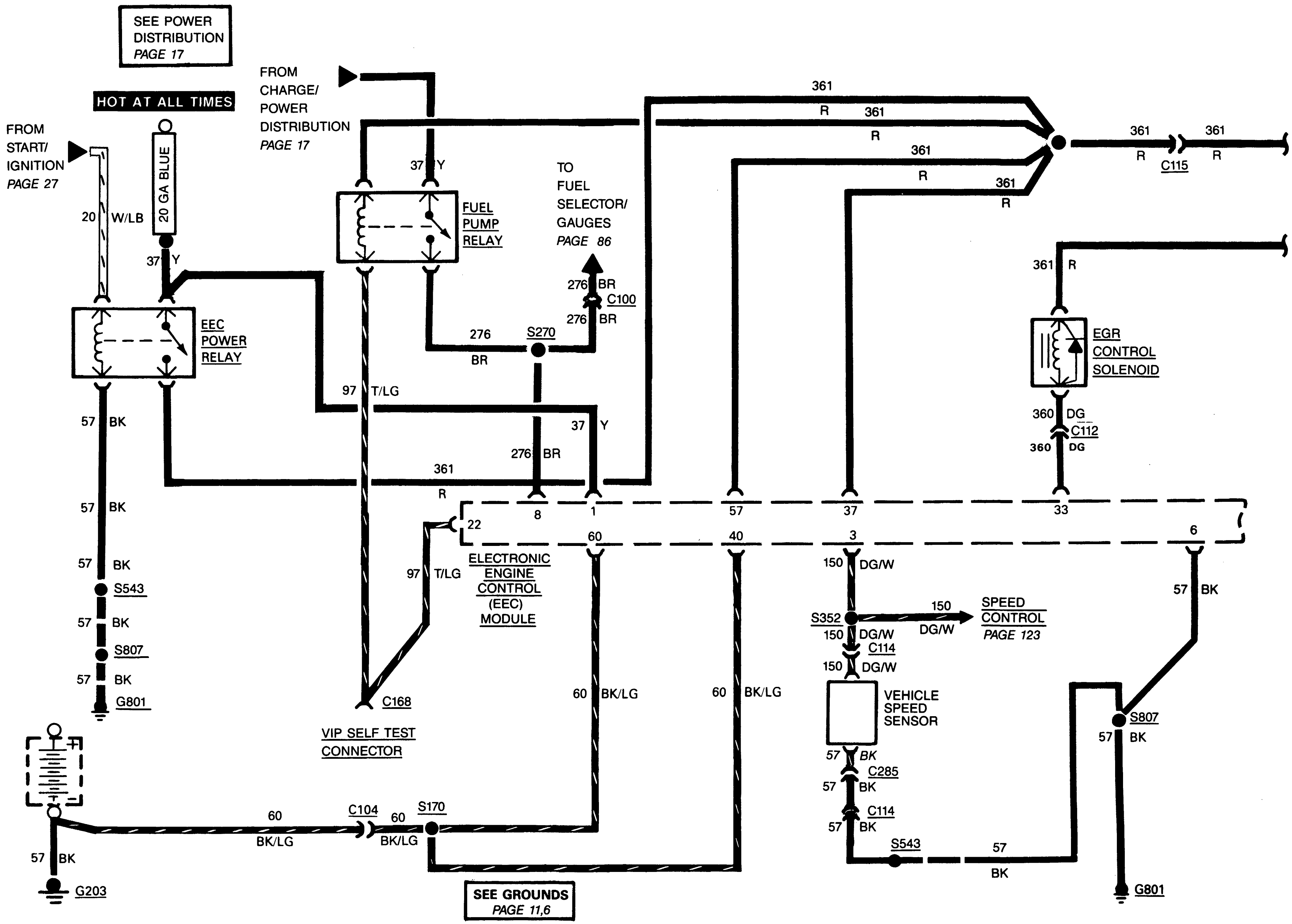
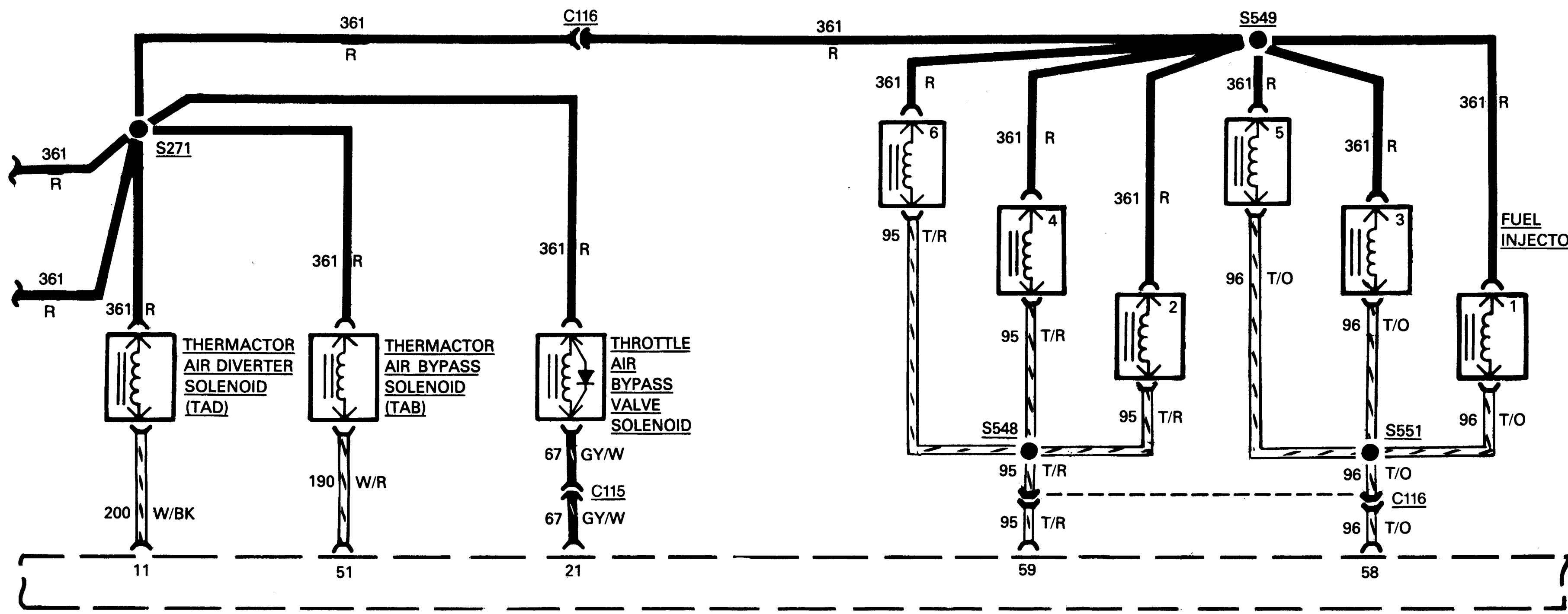
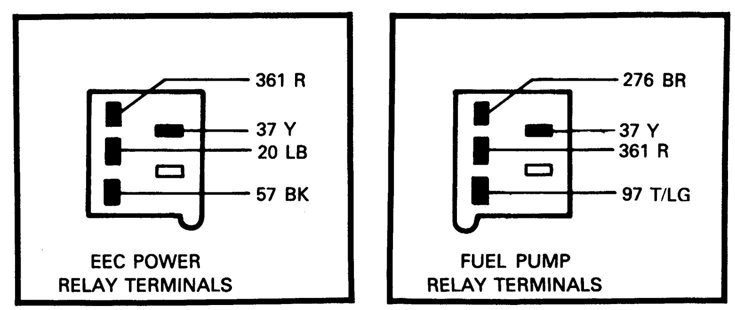
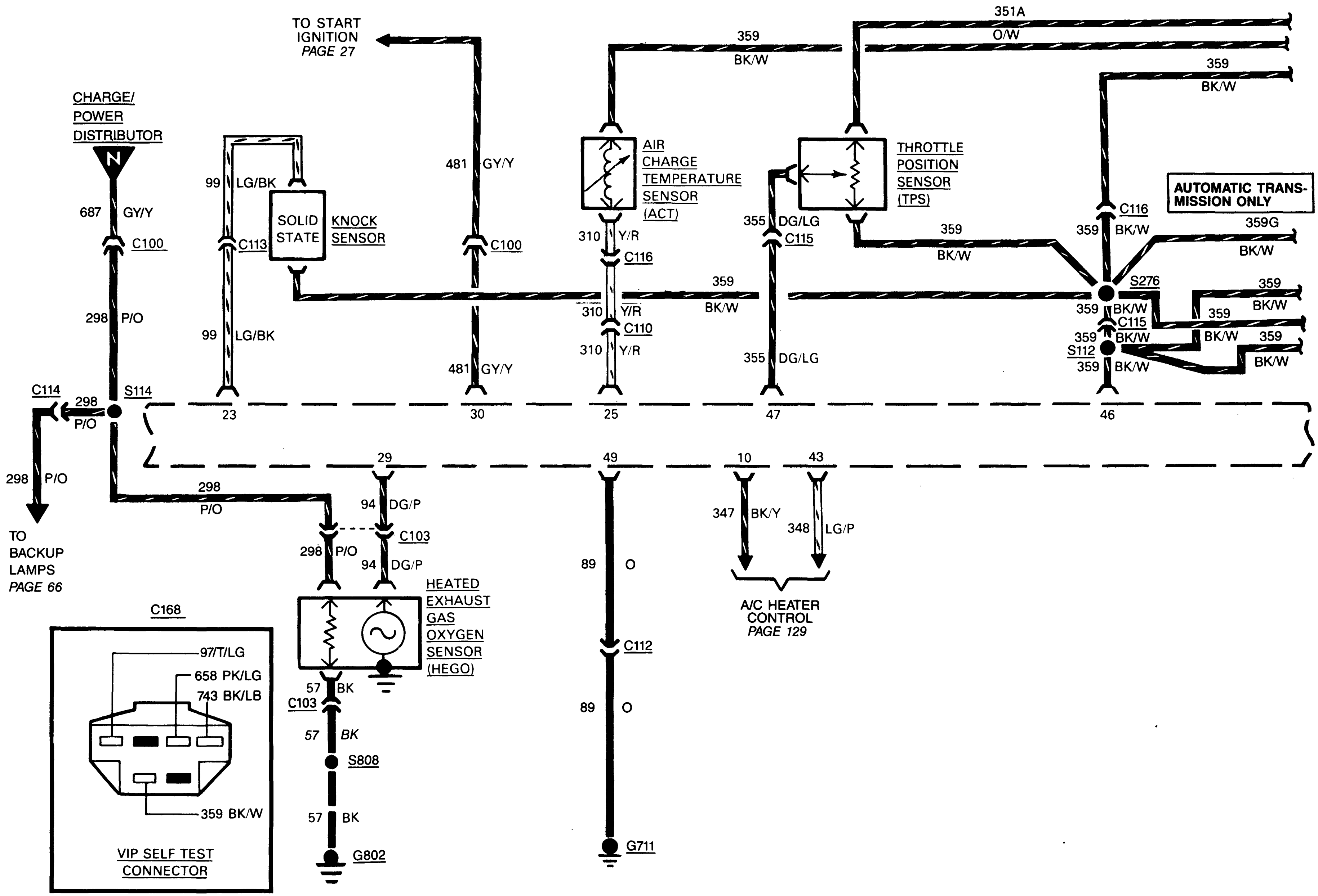


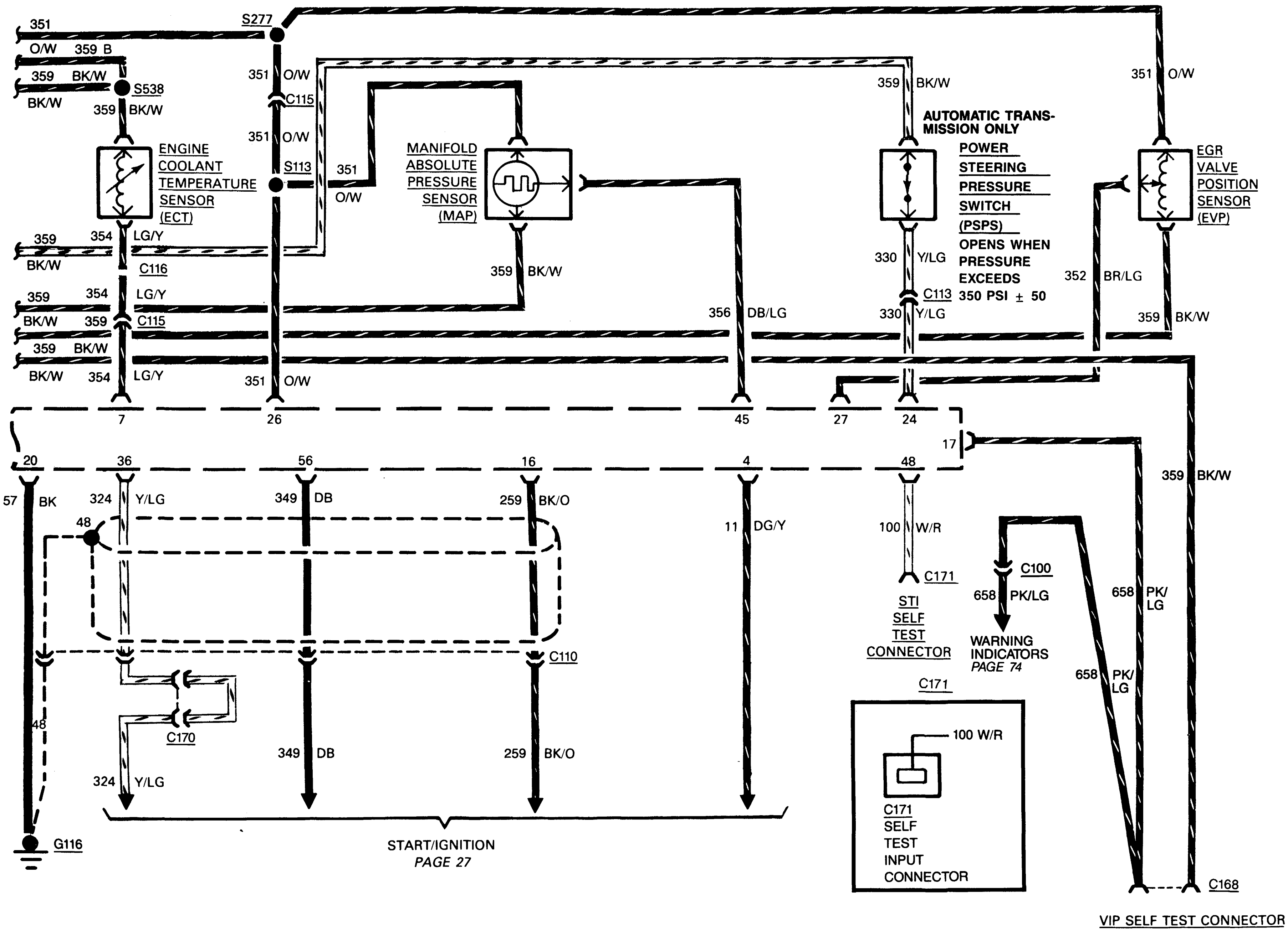
Figure 1 — Glow Plug Controller

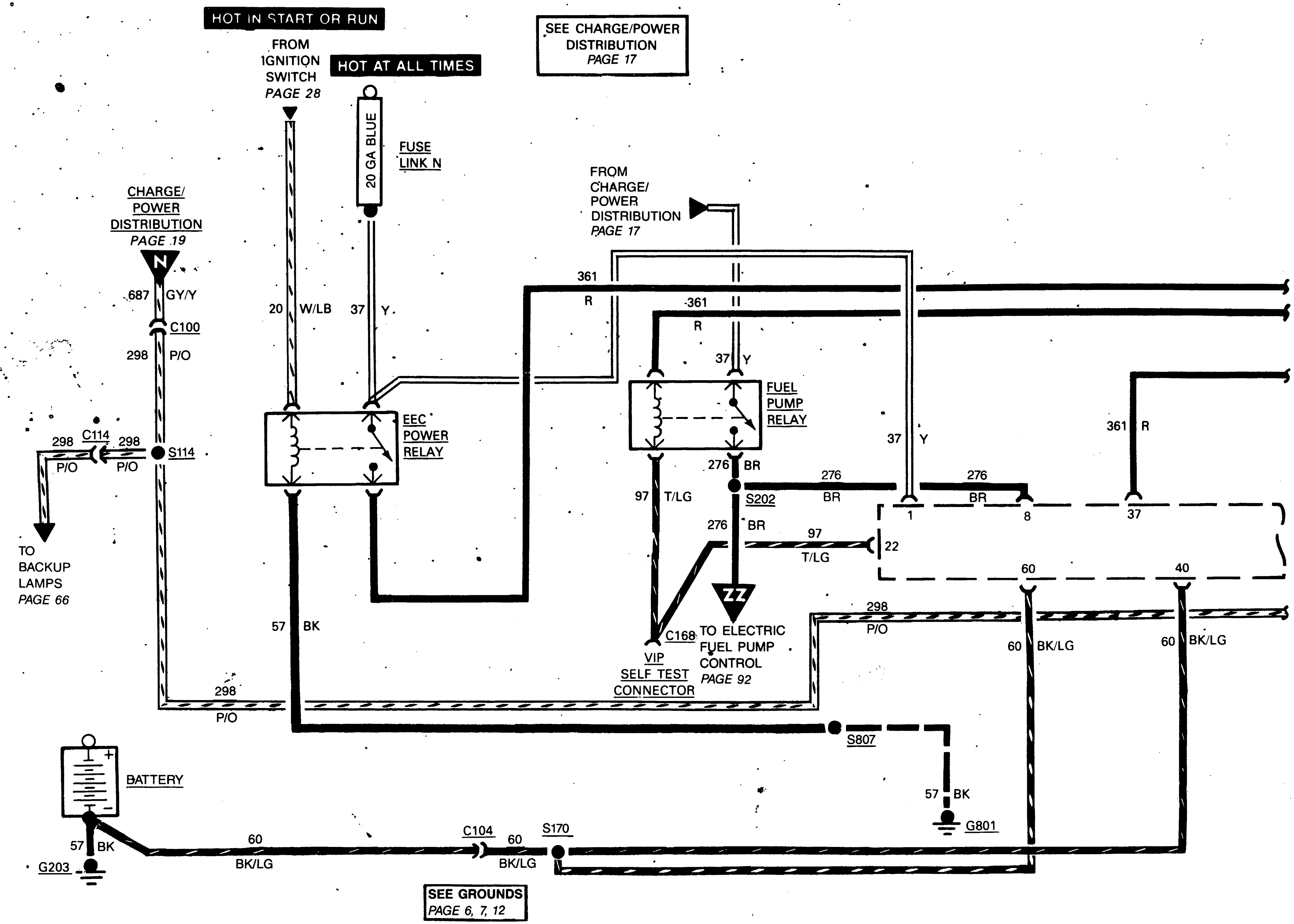

SEE POWER DISTRIBUTION PAGE 17
HOT AT ALL TIMES
FROM START/ IGNITION PAGE 27
20 W/LB
20 GA BLUE
37 Y
EEC POWER RELAY
FROM CHARGE/ POWER DISTRIBUTION PAGE 17
37 Y
FUEL PUMP RELAY
TO FUEL SELECTOR/ GAUGES PAGE 86
276 BR
C100
276 BR
276 BR
S270
97 T/LG
37 Y
276 BR
361 R
361 R
361 R
361 R
361 R
361 R
C115
361 R
EGR CONTROL SOLENOID
360 DG
C112
360 DG
57 BK
57 BK
57 BK
S543
57 BK
S807
57 BK
G801
8
1
57
37
33
22
60
40
3
6
97 T/LG
ELECTRONIC ENGINE CONTROL (EEC) MODULE
150 DG/W
S352
150 DG/W
SPEED CONTROL PAGE 123
150 DG/W
C114
150 DG/W
VEHICLE SPEED SENSOR
57 BK
C285
57 BK
C114
57 BK
S543
57 BK
57 BK
S807
57 BK
G801
C168
VIP SELF TEST CONNECTOR
60 BK/LG
60 BK/LG
60 BK/LG
C104
60 BK/LG
S170
57 BK
G203
SEE GROUNDS PAGE 11,6

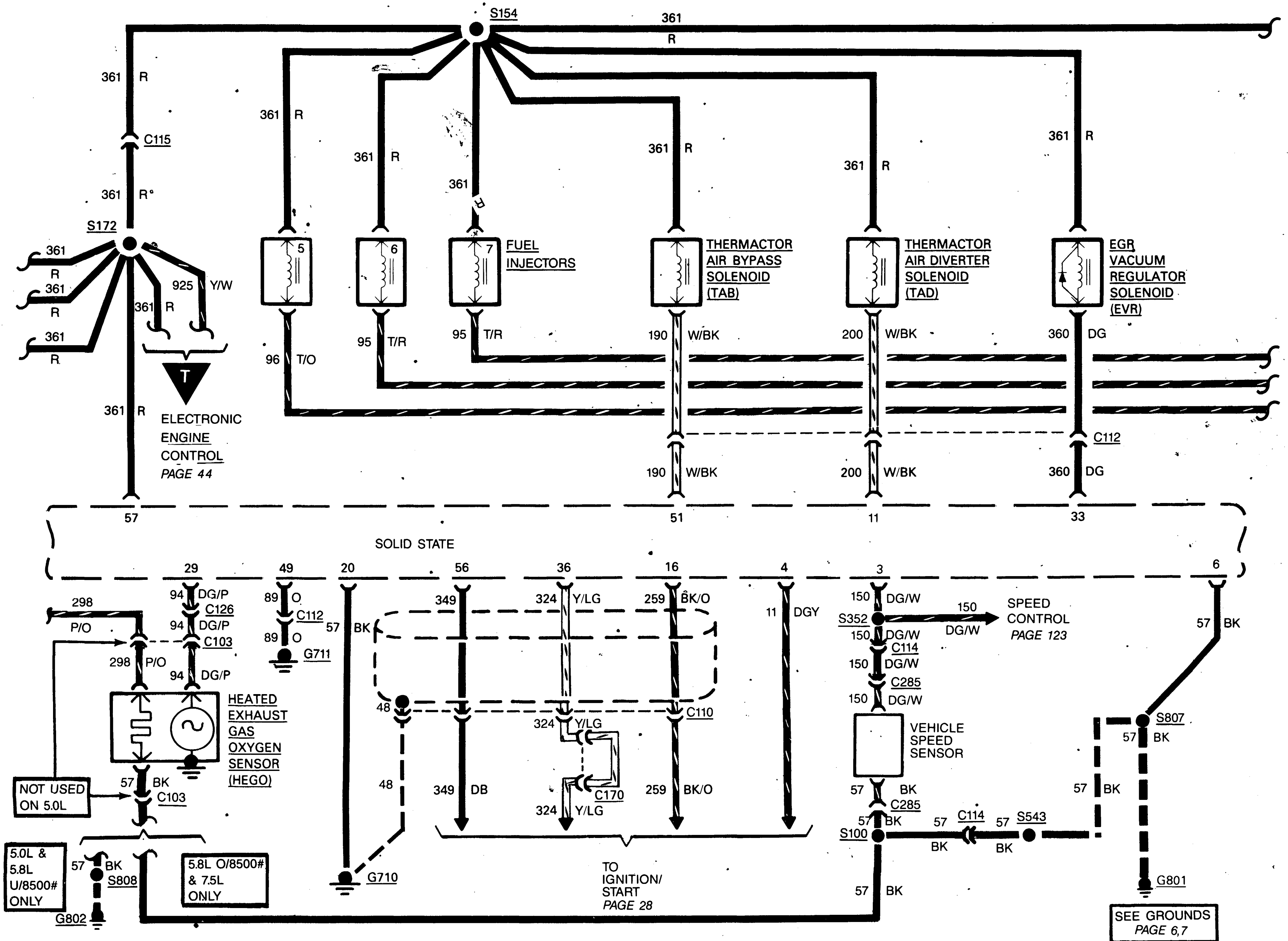

361
R
C116
361
R
S549
S271
361
R
361
R
361 R
361 R
361 R
THERMACTOR
AIR DIVERTER
SOLENOID
(TAD)
THERMACTOR
AIR BYPASS
SOLENOID
(TAB)
THROTTLE
AIR
BYPASS
VALVE
SOLENOID
200 W/BK
190 W/R
67 GY/W
C115
67 GY/W
FUEL
INJECTORS
95 T/R
96 T/O
S548
S551
C116
11
51
21
59
58

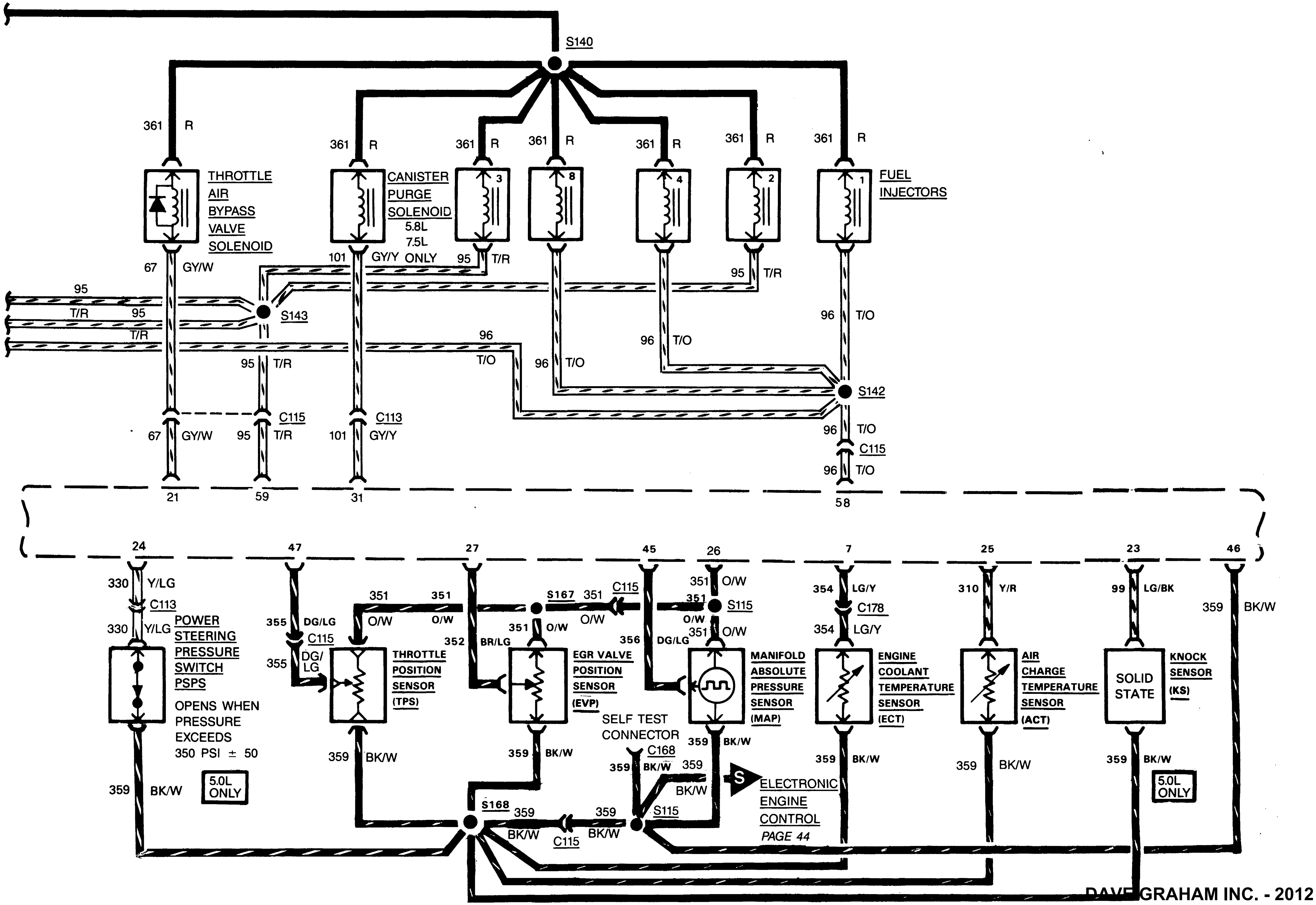

361 R
37 Y
20 LB
57 BK
EEC POWER
RELAY TERMINALS
276 BR
37 Y
361 R
97 T/LG
FUEL PUMP
RELAY TERMINALS

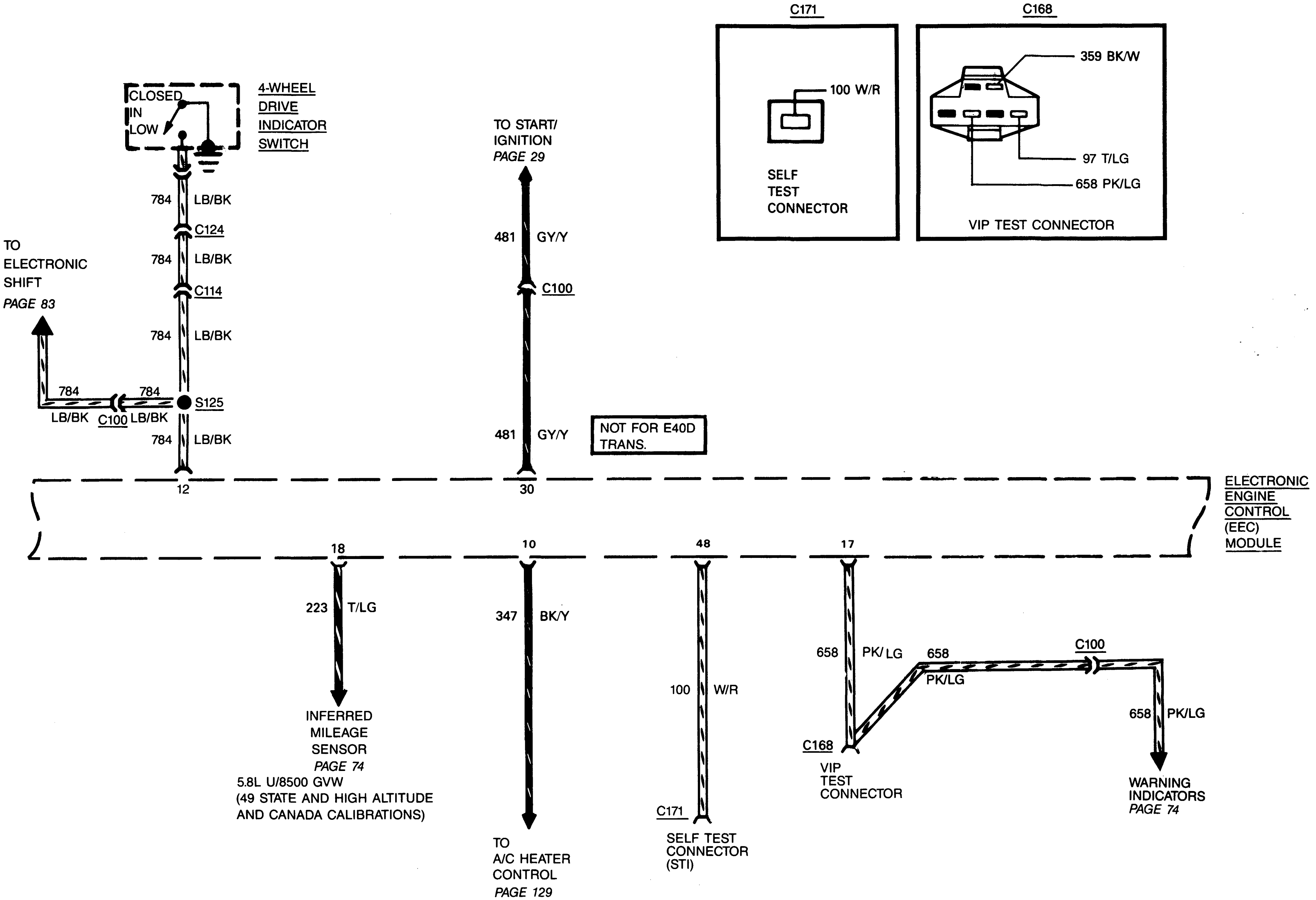

TO START IGNITION PAGE 27
CHARGE/ POWER DISTRIBUTOR
N
687 GY/Y
C100
298 P/O
S114
C114
298 P/O
298 P/O
TO BACKUP LAMPS PAGE 66
99 LG/BK
C113
SOLID STATE
KNOCK SENSOR
99 LG/BK
481 GY/Y
C100
481 GY/Y
359 BK/W
AIR CHARGE TEMPERATURE SENSOR (ACT)
310 Y/R
C116
310 Y/R
C110
310 Y/R
359 BK/W
355 DG/LG
C115
355 DG/LG
THROTTLE POSITION SENSOR (TPS)
351A O/W
359 BK/W
359 BK/W
AUTOMATIC TRANS-MISSION ONLY
C116
359 BK/W
359G BK/W
S276
359 BK/W
C115
359 BK/W
S112
359 BK/W
23
30
25
47
46
29
49
10
43
298 P/O
94 DG/P
C103
298 P/O
94 DG/P
HEATED EXHAUST GAS OXYGEN SENSOR (HEGO)
57 BK
C103
57 BK
S808
57 BK
G802
89 O
C112
89 O
G711
347 BK/Y
348 LG/P
A/C HEATER CONTROL PAGE 129
C168
97/T/LG
658 PK/LG
743 BK/LB
359 BK/W
VIP SELF TEST CONNECTOR

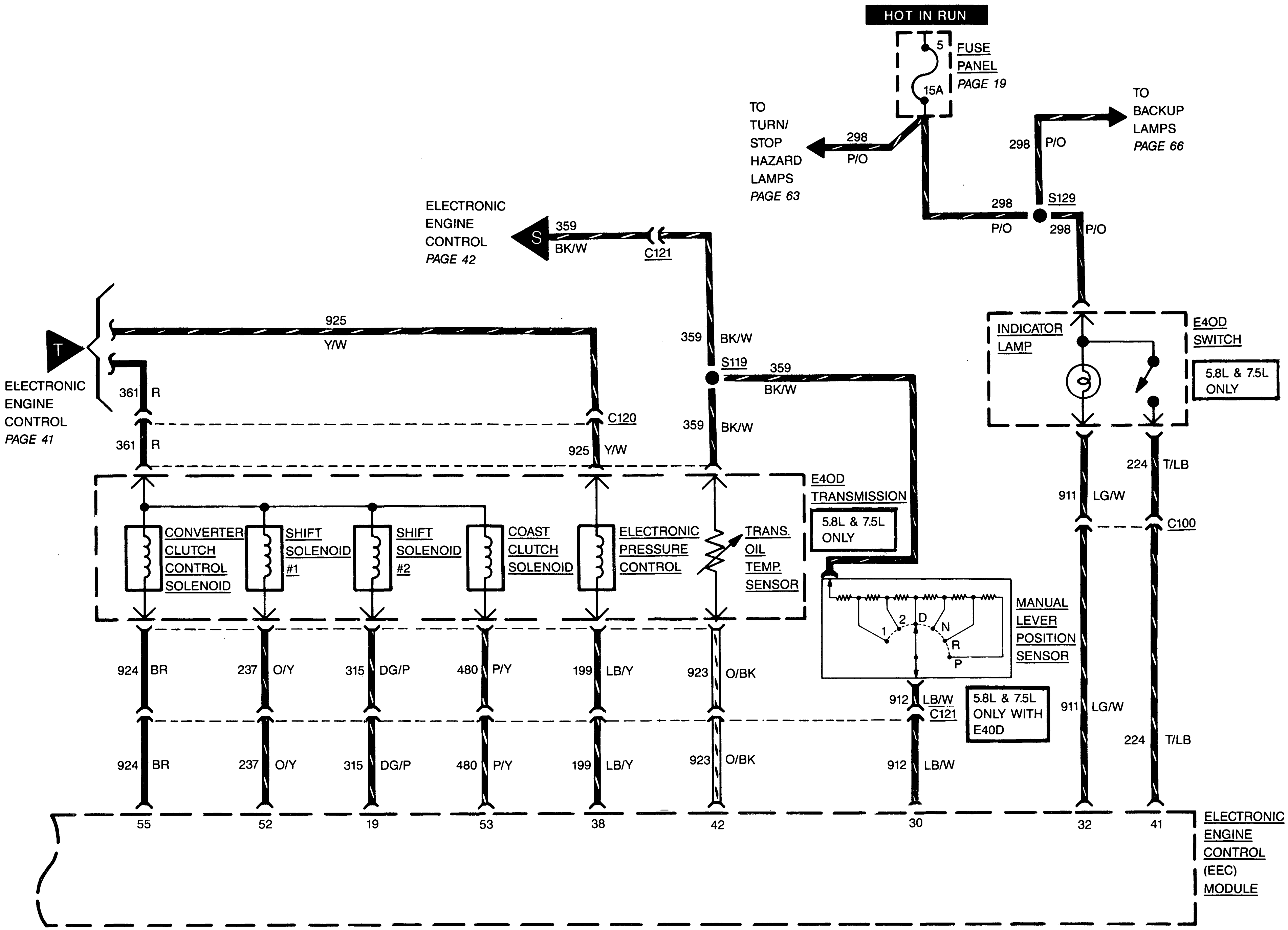

S277
351
O/W 359 B
359 BK/W
S538
BK/W
359 BK/W
351 O/W
C115
351 O/W
S113
351
O/W
ENGINE
COOLANT
TEMPERATURE
SENSOR
(ECT)
MANIFOLD
ABSOLUTE
PRESSURE
SENSOR
(MAP)
359 BK/W
AUTOMATIC TRANS-MISSION ONLY
POWER
STEERING
PRESSURE
SWITCH
(PSPS)
OPENS WHEN
PRESSURE
EXCEEDS
350 PSI ± 50
351 O/W
EGR
VALVE
POSITION
SENSOR
(EVP)
359 BK/W
354 LG/Y
C116
359 BK/W
359 BK/W
354 LG/Y
359
C115
359 BK/W
BK/W 354 LG/Y
351 O/W
356 DB/LG
330 Y/LG
C113
330 Y/LG
352 BR/LG
359 BK/W
7
26
45
27
24
17
20
36
56
16
4
48
57 BK
324 Y/LG
48
349 DB
259 BK/O
11 DG/Y
100 W/R
359 BK/W
C171
STI
SELF
TEST
CONNECTOR
C100
658 PK/LG
WARNING
INDICATORS
PAGE 74
658 PK/LG
658 PK/LG
C110
C170
48
349 DB
259 BK/O
324 Y/LG
C171
100 W/R
C171
SELF
TEST
INPUT
CONNECTOR
G116
START/IGNITION
PAGE 27
C168
VIP SELF TEST CONNECTOR

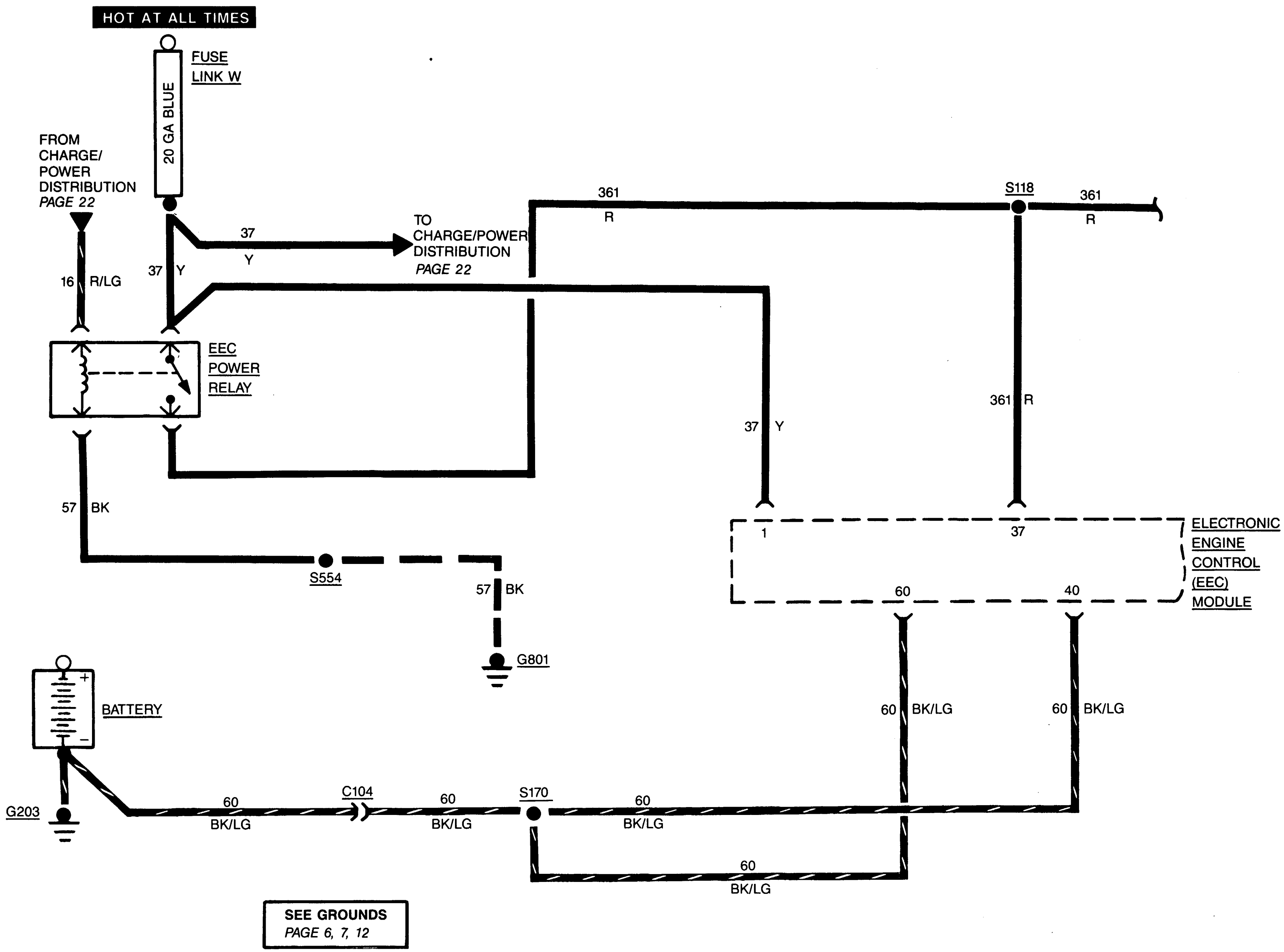

HOT IN START OR RUN
FROM IGNITION SWITCH PAGE 28
HOT AT ALL TIMES
20 GA BLUE
FUSE LINK N
SEE CHARGE/POWER DISTRIBUTION PAGE 17
FROM CHARGE/ POWER DISTRIBUTION PAGE 17
CHARGE/ POWER DISTRIBUTION PAGE 19
N
687 GY/Y
C100
298 P/O
20 W/LB
37 Y
361 R
37 Y
EEC POWER RELAY
FUEL PUMP RELAY
C114
298 P/O
S114
TO BACKUP LAMPS PAGE 66
276 BR
S202
97 T/LG
1
8
37
22
60
40
57 BK
C168
VIP SELF TEST CONNECTOR
TO ELECTRIC FUEL PUMP CONTROL PAGE 92
60 BK/LG
S807
G801
BATTERY
G203
C104
S170
SEE GROUNDS PAGE 6, 7, 12

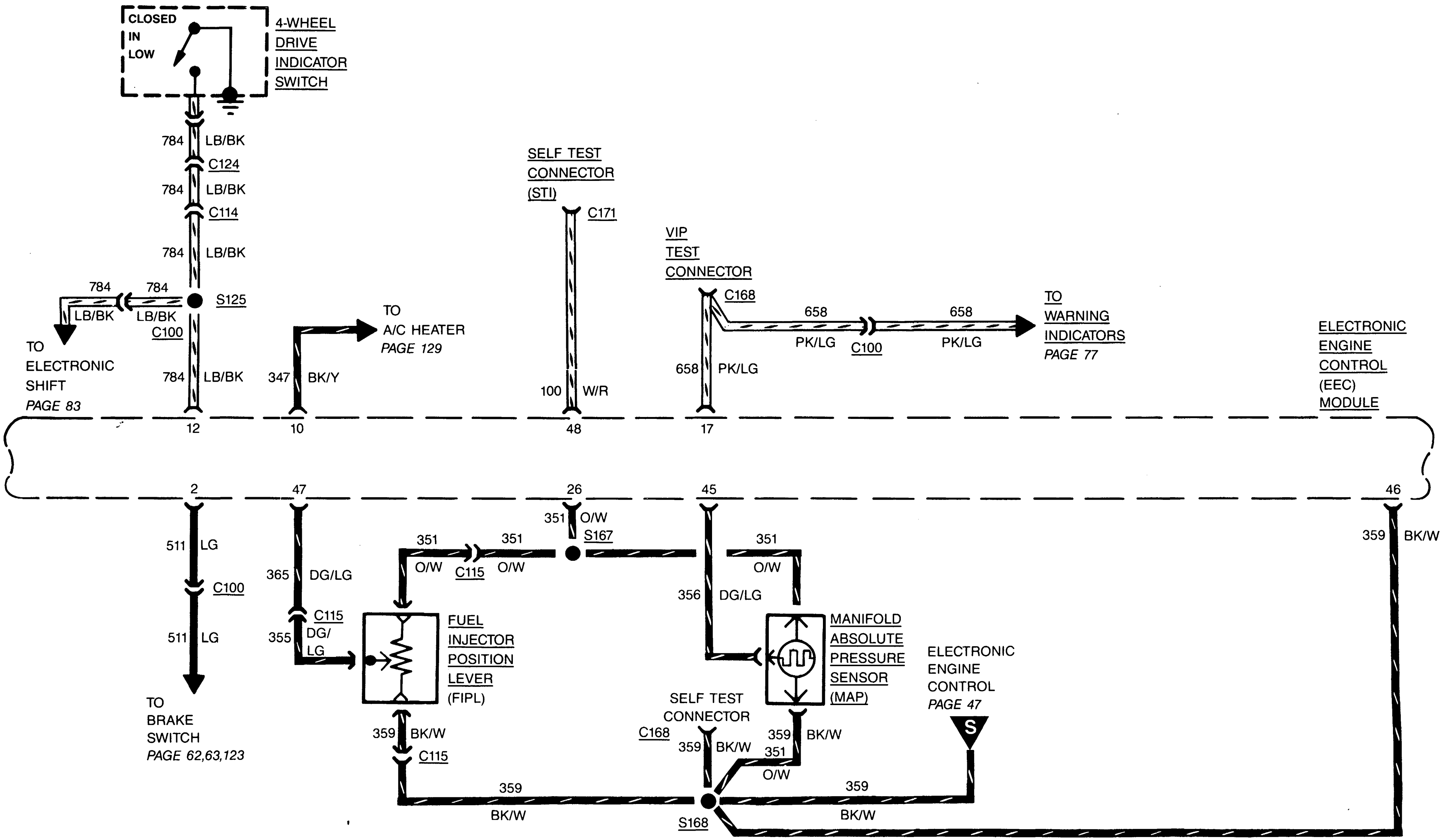

S154
361
R
361 R
C115
361 R°
S172
361 R
925 Y/W
5
6
7
FUEL INJECTORS
THERMACTOR AIR BYPASS SOLENOID (TAB)
THERMACTOR AIR DIVERTER SOLENOID (TAD)
EGR VACUUM REGULATOR SOLENOID (EVR)
96 T/O
95 T/R
190 W/BK
200 W/BK
360 DG
C112
ELECTRONIC ENGINE CONTROL PAGE 44
57
51
11
33
SOLID STATE
29
49
20
56
36
16
4
3
6
298 P/O
94 DG/P
C126
C103
89 O
G711
57 BK
349
324 Y/LG
259 BK/O
11 DGY
150 DG/W
S352
SPEED CONTROL PAGE 123
C114
C285
HEATED EXHAUST GAS OXYGEN SENSOR (HEGO)
48
C110
C170
349 DB
VEHICLE SPEED SENSOR
S807
NOT USED ON 5.0L
5.0L & 5.8L U/8500# ONLY
S808
G802
5.8L O/8500# & 7.5L ONLY
G710
TO IGNITION/ START PAGE 28
S100
S543
G801
SEE GROUNDS PAGE 6,7

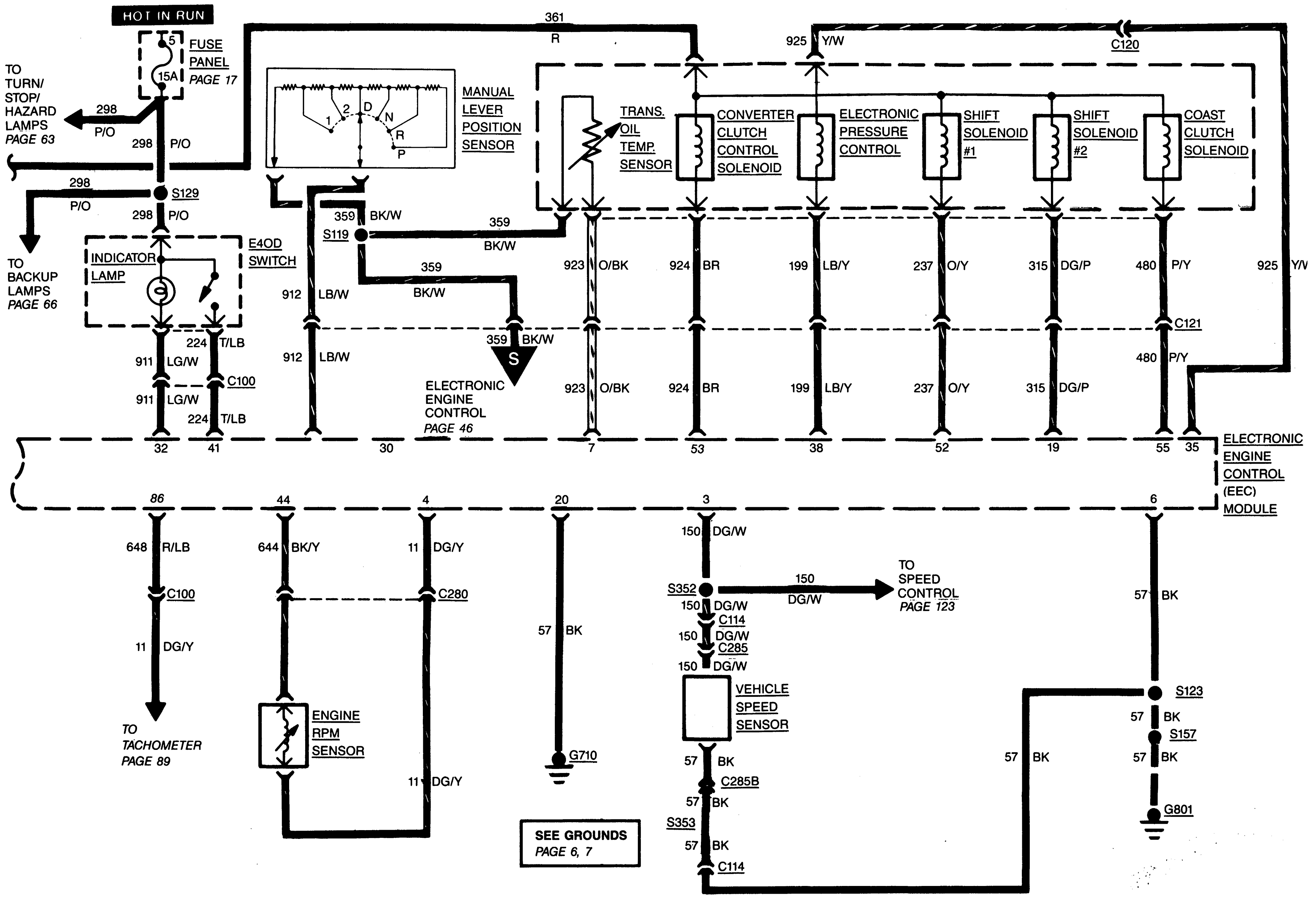

S140
361 R
THROTTLE AIR BYPASS VALVE SOLENOID
CANISTER PURGE SOLENOID 5.8L 7.5L ONLY
FUEL INJECTORS
67 GY/W
101 GY/Y
95 T/R
S143
96 T/O
S142
C115
C113
21
59
31
58
24
47
27
45
26
7
25
23
46
330 Y/LG
POWER STEERING PRESSURE SWITCH PSPS
OPENS WHEN PRESSURE EXCEEDS 350 PSI ± 50
5.0L ONLY
355 DG/LG
351 O/W
THROTTLE POSITION SENSOR (TPS)
352 BR/LG
S167
EGR VALVE POSITION SENSOR (EVP)
356 DG/LG
S115
MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)
354 LG/Y
C178
ENGINE COOLANT TEMPERATURE SENSOR (ECT)
310 Y/R
AIR CHARGE TEMPERATURE SENSOR (ACT)
99 LG/BK
SOLID STATE
KNOCK SENSOR (KS)
359 BK/W
SELF TEST CONNECTOR
C168
S168
ELECTRONIC ENGINE CONTROL PAGE 44


C171
100 W/R
SELF
TEST
CONNECTOR
C168
359 BK/W
97 T/LG
658 PK/LG
VIP TEST CONNECTOR
CLOSED
IN
LOW
4-WHEEL
DRIVE
INDICATOR
SWITCH
784 LB/BK
C124
784 LB/BK
C114
784 LB/BK
TO
ELECTRONIC
SHIFT
PAGE 83
784
784
S125
LB/BK
C100
LB/BK
784 LB/BK
TO START/
IGNITION
PAGE 29
481 GY/Y
C100
481 GY/Y
NOT FOR E40D
TRANS.
12
30
ELECTRONIC
ENGINE
CONTROL
(EEC)
MODULE
18
10
48
17
223 T/LG
INFERRED
MILEAGE
SENSOR
PAGE 74
5.8L U/8500 GVW
(49 STATE AND HIGH ALTITUDE
AND CANADA CALIBRATIONS)
347 BK/Y
TO
A/C HEATER
CONTROL
PAGE 129
100 W/R
C171
SELF TEST
CONNECTOR
(STI)
658 PK/LG
658
PK/LG
C100
658 PK/LG
C168
VIP
TEST
CONNECTOR
WARNING
INDICATORS
PAGE 74


HOT IN RUN
5
15A
FUSE PANEL
PAGE 19
TO TURN/ STOP HAZARD LAMPS
PAGE 63
298
P/O
TO BACKUP LAMPS
PAGE 66
S129
ELECTRONIC ENGINE CONTROL
PAGE 42
S
359
BK/W
C121
T
ELECTRONIC ENGINE CONTROL
PAGE 41
925
Y/W
361
R
C120
S119
E4OD SWITCH
INDICATOR LAMP
5.8L & 7.5L ONLY
224
T/LB
911
LG/W
C100
E4OD TRANSMISSION
5.8L & 7.5L ONLY
CONVERTER CLUTCH CONTROL SOLENOID
SHIFT SOLENOID #1
SHIFT SOLENOID #2
COAST CLUTCH SOLENOID
ELECTRONIC PRESSURE CONTROL
TRANS. OIL TEMP. SENSOR
MANUAL LEVER POSITION SENSOR
1
2
D
N
R
P
912
LB/W
5.8L & 7.5L ONLY WITH E40D
924
BR
237
O/Y
315
DG/P
480
P/Y
199
LB/Y
923
O/BK
55
52
19
53
38
42
30
32
41
ELECTRONIC ENGINE CONTROL (EEC) MODULE


HOT AT ALL TIMES
FUSE LINK W
20 GA BLUE
FROM CHARGE/ POWER DISTRIBUTION PAGE 22
16 R/LG
37 Y
37
Y
TO CHARGE/POWER DISTRIBUTION PAGE 22
361
R
S118
361
R
EEC POWER RELAY
361 R
37 Y
57 BK
S554
57 BK
G801
1
37
60
40
ELECTRONIC ENGINE CONTROL (EEC) MODULE
BATTERY
60 BK/LG
60 BK/LG
G203
60
BK/LG
C104
60
BK/LG
S170
60
BK/LG
60
BK/LG
SEE GROUNDS PAGE 6, 7, 12


CLOSED IN LOW
4-WHEEL DRIVE INDICATOR SWITCH
784 LB/BK
C124
784 LB/BK
C114
784 LB/BK
784
784
S125
LB/BK
LB/BK
C100
TO ELECTRONIC SHIFT PAGE 83
784 LB/BK
347 BK/Y
TO A/C HEATER PAGE 129
SELF TEST CONNECTOR (STI)
C171
100 W/R
VIP TEST CONNECTOR
C168
658
PK/LG
C100
658
PK/LG
TO WARNING INDICATORS PAGE 77
658 PK/LG
ELECTRONIC ENGINE CONTROL (EEC) MODULE
12
10
48
17
2
47
26
45
46
511 LG
C100
511 LG
TO BRAKE SWITCH PAGE 62,63,123
365 DG/LG
C115
355 DG/ LG
351 O/W
S167
351
351
O/W
C115
O/W
351
O/W
356 DG/LG
FUEL INJECTOR POSITION LEVER (FIPL)
MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)
ELECTRONIC ENGINE CONTROL PAGE 47
S
359 BK/W
359 BK/W
C115
SELF TEST CONNECTOR
C168
359 BK/W
359 BK/W
351
O/W
359
BK/W
359
BK/W
S168


HOT IN RUN
FUSE PANEL PAGE 17
15A
TO TURN/ STOP/ HAZARD LAMPS PAGE 63
298 P/O
S129
TO BACKUP LAMPS PAGE 66
INDICATOR LAMP
E4OD SWITCH
911 LG/W
224 T/LB
C100
MANUAL LEVER POSITION SENSOR
361 R
925 Y/W
C120
359 BK/W
S119
912 LB/W
ELECTRONIC ENGINE CONTROL PAGE 46
TRANS. OIL TEMP. SENSOR
CONVERTER CLUTCH CONTROL SOLENOID
ELECTRONIC PRESSURE CONTROL
SHIFT SOLENOID #1
SHIFT SOLENOID #2
COAST CLUTCH SOLENOID
923 O/BK
924 BR
199 LB/Y
237 O/Y
315 DG/P
480 P/Y
C121
ELECTRONIC ENGINE CONTROL (EEC) MODULE
648 R/LB
TO TACHOMETER PAGE 89
644 BK/Y
11 DG/Y
C280
ENGINE RPM SENSOR
57 BK
G710
SEE GROUNDS PAGE 6, 7
150 DG/W
S352
TO SPEED CONTROL PAGE 123
C114
C285
VEHICLE SPEED SENSOR
C285B
S353
S123
S157
G801

HOW THE CIRCUIT WORKS

Gasoline Engine

The **Electronic Engine Control-IV System (EEC-IV)** is a controlling system designed to optimize tailpipe emissions, fuel economy, driveability, and performance. This is accomplished by means of an on-board **Electronic Engine Control (EEC) Module,** which receives input from various sensors. The **EEC Module** makes computations based on these inputs, then sends controlling signals to various components to achieve desired air/fuel ratio, ignition timing, EGR flow, **Thermactor** air flow and idle speed.

Diesel Engine with E4OD Transmission

The **Electronic Engine Control-IV System (EEC-IV)** is employed on the 7.3L diesel engine only to operate the **E4OD Automatic Transmission.** This transmission requires the **Electronic Engine Control (EEC) Module** to provide electronic control of the locking converter clutch and shift/kickdown controls.

System Inputs

The **Profile Ignition Pick-Up (PIP) Sensor** supplies crankshaft position and frequency information to the **EEC Module** (from the distributor).

The **Throttle Position Sensor (TPS)** provides the **EEC Module** with a signal proportional to the angle of the throttle plate.

The **Engine Coolant Temperature (ECT) Sensor** monitors the temperature of the engine coolant and provides a corresponding signal to the **EEC Module.**

The **Heated Exhaust Gas Oxygen (HEGO) Sensor** sends a voltage signal to the **EEC Module** which indicates the oxygen level in the exhaust gases.

The **Manifold Absolute Pressure (MAP) Sensor** measures the pressure in the intake manifold and provides this information as a variable fre-

COMPONENT LOCATION

Component	Location	Page-Figure
Air Charge Temperature Sensor	4.9L Front lower intake manifold runner	133-2
	5.0L Front lower intake manifold runner	136-4
	5.8L Front lower intake manifold runner	136-4
	7.5L Front lower intake manifold runner	—
Canister Purge Solenoid	5.8L, 7.5L RH side engine	—
EEC Clutch Switch	Above clutch pedal	—
EEC Power Relay	Under plastic shield at the air cleaner support bracket	—
EGR Vacuum Regulator Solenoid	4.9L at rear of engine on rocker cover bracket	—
	5.0L on bracket behind ignition coil	136-4
	5.8L on bracket behind ignition coil	136-4
	7.5L on bracket behind ignition coil	—
EGR Valve Position Sensor	At EGR valve on intake manifold	133-1,135-3
Electronic Engine Control (EEC) Module	Behind LH kick panel	—
Engine Coolant Temperature Sensor	4.9L at thermostat housing	134-2
	5.0L at intake manifold	136-4
	5.8L at intake manifold	136-4
	7.5L at intake manifold	—
Engine RPM Sensor (Diesel)	At injection pump timing gear cover	138-6,137-5
Fuel Pump Relay	Under plastic shield at the air cleaner support bracket	—
Fuse Link N	Near starter relay	—
Fuse Link W	At EEC power relay	—
Heated Exhaust Gas Oxygen Sensor	In communicator tube connecting both exhaust pipes	134-2,135-3
Knock Sensor	4.9L in cylinder block forward of the distributor	133-1
	5.0L in cylinder block behind the intake manifold	—

(Continued on next page)

quency signal to the **EEC Module.** With the ignition switch in the Key-On/Engine Off position, the MAP sensor measures the Barometric Pressure in the intake manifold. With the ignition switch in the Key-On/Engine-Running position, the MAP sensor measures the varying pressure (Vacuum) in the intake manifold.

The **Power Steering** pressure switch signals the **EEC Module** when the power steering pressure increases the load on the engine, to increase the idle speed (4.9L Auto. Trans. and 5.0L only).

The **EGR Valve Position (EVP) Sensor** signals the **EEC Module** with the position of the **EGR valve pintle** position.

The **Air Charge Temperature (ACT) Sensor** signals the **EEC Module** with the temperature of the air in the intake manifold.

The **Knock Sensor** signals the **EEC Module** to retard timing if the engine starts to detonate (4.9L and 5.0L only).

An **A/C Clutch Compressor (ACC) Signal** is used to indicate to the **EEC Module** when the A/C compressor is turned On. This will allow the **EEC Module** to increase the engine idle speed and/or compensate for the increased load.

The **Vehicle Speed Sensor** provides a frequency to the **EEC Module** to indicate vehicle speed. The **EEC Module** uses this input for idle speed control and decel fuel shutoff (4.9L, 5.0L, and 5.8L only).

COMPONENT LOCATION

Component	Location	Page-Figure
Manifold Absolute Pressure Sensor	On bracket above heater or A/C evaporator housing	—
Power Steering Pressure Switch	In power steering pressure hose near the steering gear	—
Thermactor Air Bypass Solenoid	4.9L at left rear of engine on rocker cover bracket	133-1
	5.0L on bracket behind ignition coil	136-4
	5.8L on bracket behind ignition coil	136-4
	7.5L on bracket behind ignition coil	—
Thermactor Air Diverter Solenoid	4.9L at left rear of engine on rocker cover bracket	133-1
	5.0L on bracket behind ignition coil	136-4
	5.8L on bracket behind ignition coil	136-4
	7.5L on bracket behind ignition coil	—
Throttle Air Bypass Valve Solenoid	On throttle body	133-1,136-4
Throttle Position Sensor	Connected to throttle body shaft	133-1,135-3

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

The A/C demand **(ACD)** signal is used to indicate to the **EEC Module** when the climate control switch is in any mode requesting A/C. This will allow the **EEC Module** to increase the engine idle speed (4.9L only).

System Outputs

Receiving a signal from the **Engine RPM Sensor,** the **EEC Module** conditions this signal and provides a buffered engine RPM signal to the **Instrument Cluster Tachometer** (7.3L Diesel with **E40D Transmission** only).

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Intermittent Trouble Codes	• Loose EEC connector	• Clean/Tighten and check wiring
NOTE: The EEC-IV system retains any intermittent trouble codes stored within the last 40 engine starts. With this system, the memory is not erased when the key is turned to OFF. However, memory will be lost if the Battery is disconnected.		

Fuel flow is controlled by **fuel injector solenoids** (six in 6 Cyl. engine, eight in 8 Cyl. engine). The **EEC Module** regulates the amount of fuel injected into each cylinder by the on/off time of the injectors. The longer the on-time, the greater the fuel flow through the injectors. The **EEC Module** uses information received from the system input sensors to determine injector on/off-time.

Fuel pressure is built up by the Electric Fuel Pumps when the **EEC Module** supplies a ground through circuit 97 to the **Fuel Pump Relay.** With the **Ignition Switch** in START or RUN, the **EEC Power Relay** supplies voltage through circuit 361 R, to the **Fuel Pump Relay.** This voltage energizes the **Fuel Pump Relay.**

With power applied through the **EEC Power Relay** to the **Fuel Pump Relay,** and with the **Inertia Switch** closed, power is applied to the **Fuel Pumps.**

Current to the **In-Tank Fuel Pump** passes through a resistance wire and this pump, mounted in the fuel tank, pumps fuel at low (5 psi) pressure. Pressure is boosted by the **In-Line Fuel Pump**.

The efficiency of the catalytic converter is dependent upon the temperature and chemical make-up of exhaust gases. A **Thermactor** air system is used to supply secondary air to the exhaust manifold(s), to the catalyst or to the atmosphere, depending on engine conditions sensed by the **EEC Module** through the system inputs.

When the **Thermactor Air Bypass Solenoid** is OFF (de-energized), Thermactor air is dumped to the atmosphere rather than routed to the catalytic converter or exhaust manifold.

With the **Thermactor Air Bypass Solenoid** ON (energized) and the **Thermactor Air Diverter Solenoid** OFF (de-energized) Thermactor air is downstream (to the catalytic converter).

When the **Thermactor Air Bypass Solenoid** and the **Thermactor Air Diverter Solenoid** are ON (energized), Thermactor air is diverted to the exhaust manifold (upstream).

> NOTE
> The 7.5L has only a **Thermactor Air Bypass Solenoid;** thermactor air is either dumped (de-energized) or rounted to the catalyst (energenized).

The **Throttle Air Bypass Valve Solenoid** is an electro-mechanical device controlled by the **EEC Module.** It incorporates a solenoid which positions a variable-area metering valve. This valve is used to control both warm and cold engine airflow into the intake manifold. This allows the **EEC Module** to control the engine warm and cold speed, and allow for "no-touch" starting.

The **EGR Vacuum Regulator Solenoid** controls EGR valve movement. The **EEC Module** receives data from various sensors. It also checks existing valve position through the **EGR Valve Position Sensor** and calculates if the present EGR flow should be increased, maintained or decreased. The **EEC Module** then determines a proper duty cycle for the **EGR Vacuum Regulator Solenoid** on time to control the EGR valve position.

The **Thick Film Integrated IV (TFI-IV) Ignition Module** supplies the spark signal to the distributor through the ignition coil, and calculates the duration. It receives its control signal from the **EEC Module** through the spark output circuit (324 Y/LG).

E4OD Transmission

The **E4OD Transmission** supplies inputs to and receives outputs from the **EEC Module.**

INPUTS

The **E4OD Switch** is used to inform the **EEC Module** when a condition of overdrive cancel on the **E4OD** transmission has been requested.

The **Manual Lever Position Switch** provides the **EEC Module** with transmission lever position information for operation of the **E40D** transmission.

The **Transmission Oil Temperature Sensor** is used to control shift points as a function of temperature.

The **4-Wheel Drive Indicator Switch** informs the **EEC Module** of 4X4 Low selection.

OUTPUTS

The **Converter Clutch Control Solenoid** controls converter clutch lockup.

The **Coast Clutch Control Solenoid** permits engine braking in third gear and overdrive.

The **Electronic Pressure Control** regulates internal line pressure.

The **Shift Solenoid #1** and **Shift Solenoid #2** control the gear selection of the transmission.

> **Refer to the Engine/Emissions Diagnosis Manual, volume H, and Technical Service Bulletins for complete EEC-IV test procedures using special Rotunda test equipment.**

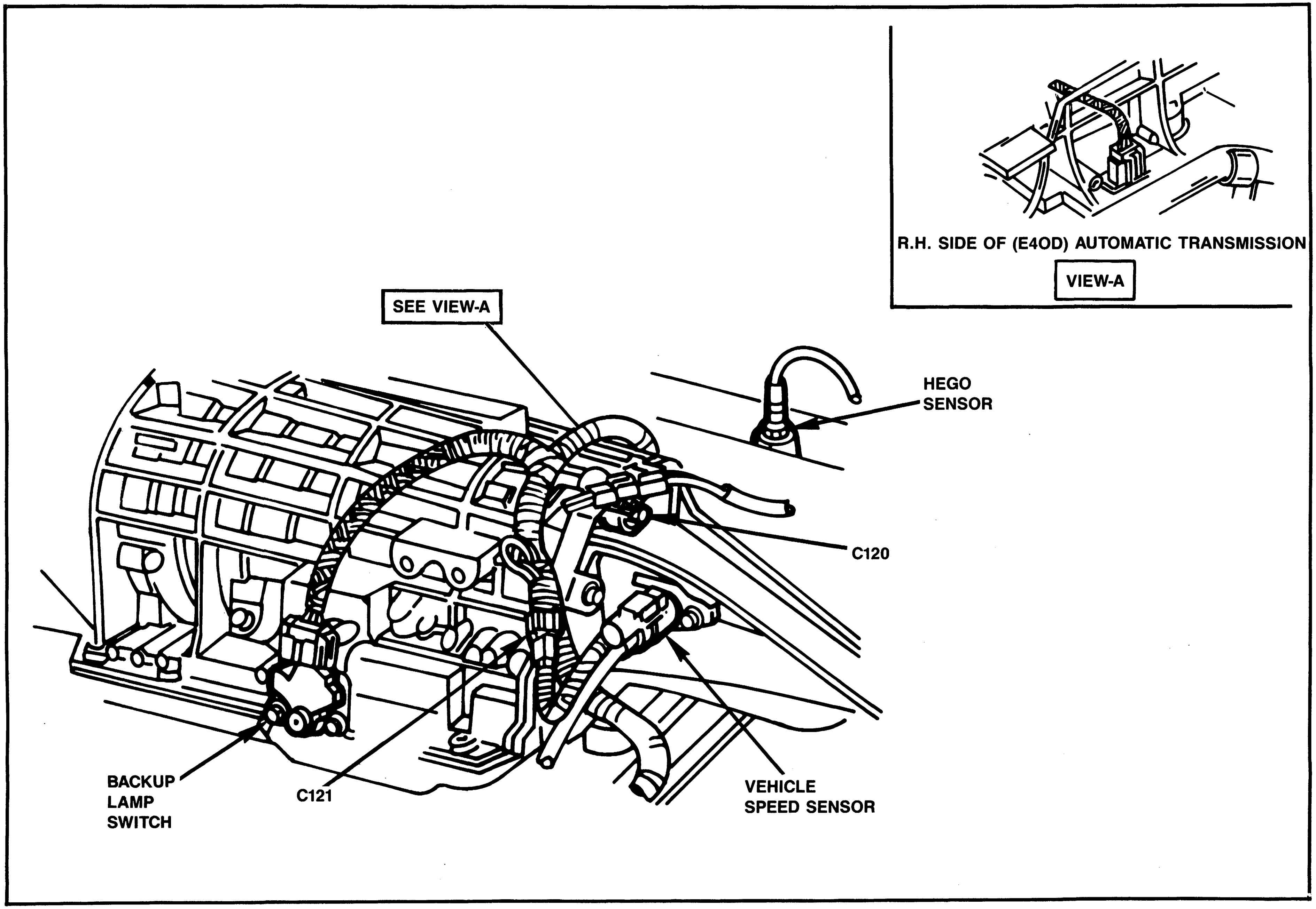
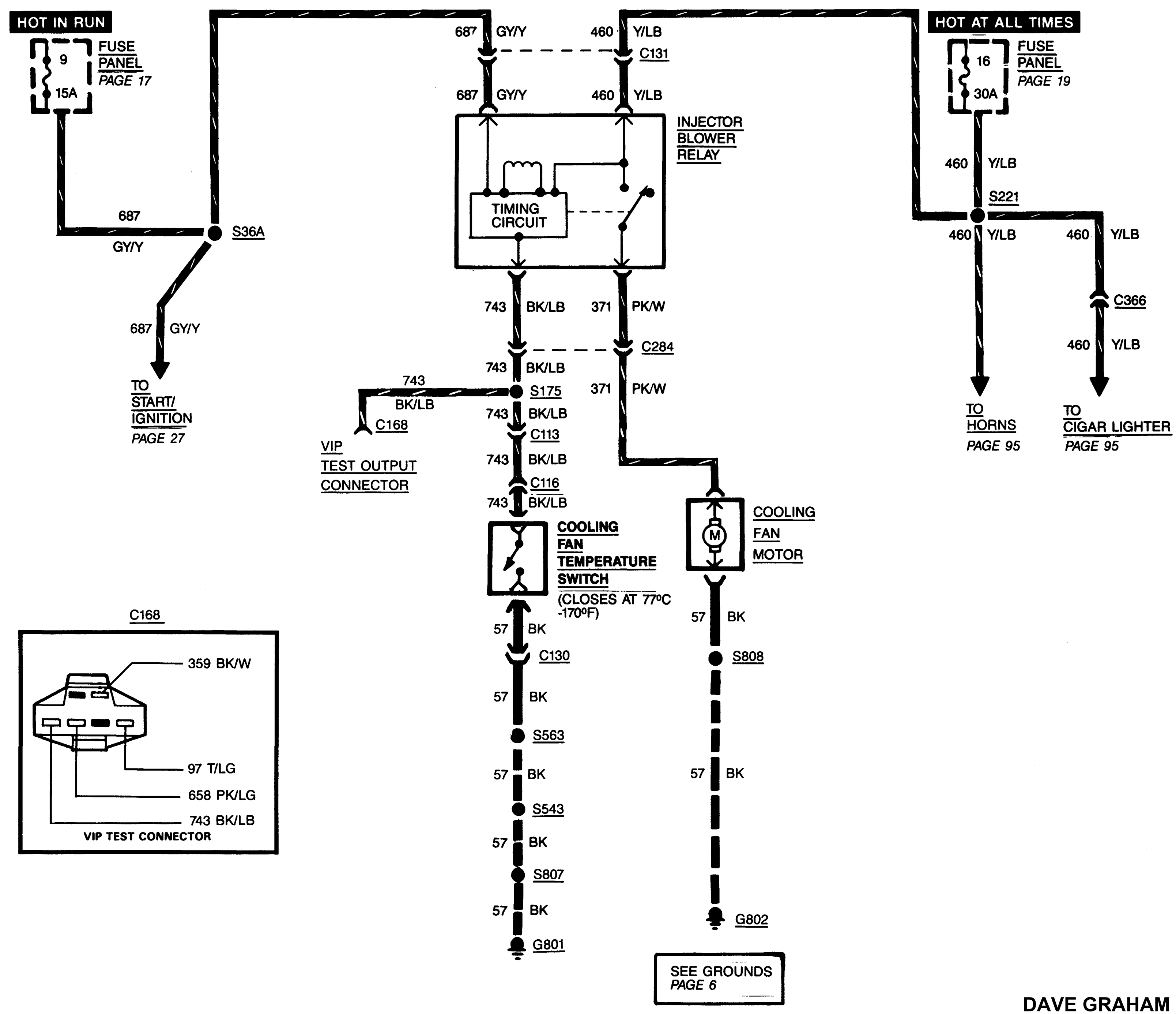


Figure 1 — E40D Transmission

52 FUEL INJECTOR COOLING FAN (4.9L ENGINE)



HOW THE CIRCUIT WORKS

The **Injector Blower Motor** will operate for a maximum of 15 minutes with the **Ignition Switch** in OFF and the **Cooling Fan Temperature Switch** closed. The **Injector Blower Relay** will disable the **Cooling Fan Motor** if the **Cooling Fan Temperature Switch** opens before 15 minutes or if the **Ignition Switch** is turned to RUN. Proper operation of the **Cooling Fan Motor** system can be established by grounding circuit **743 BK/LB** at the **VIP** connector (the **Ignition Switch** must be in OFF) and timing the fan ON time. The maximum ON time is 15 minutes.

Refer to section 28-01 of the shop manual.

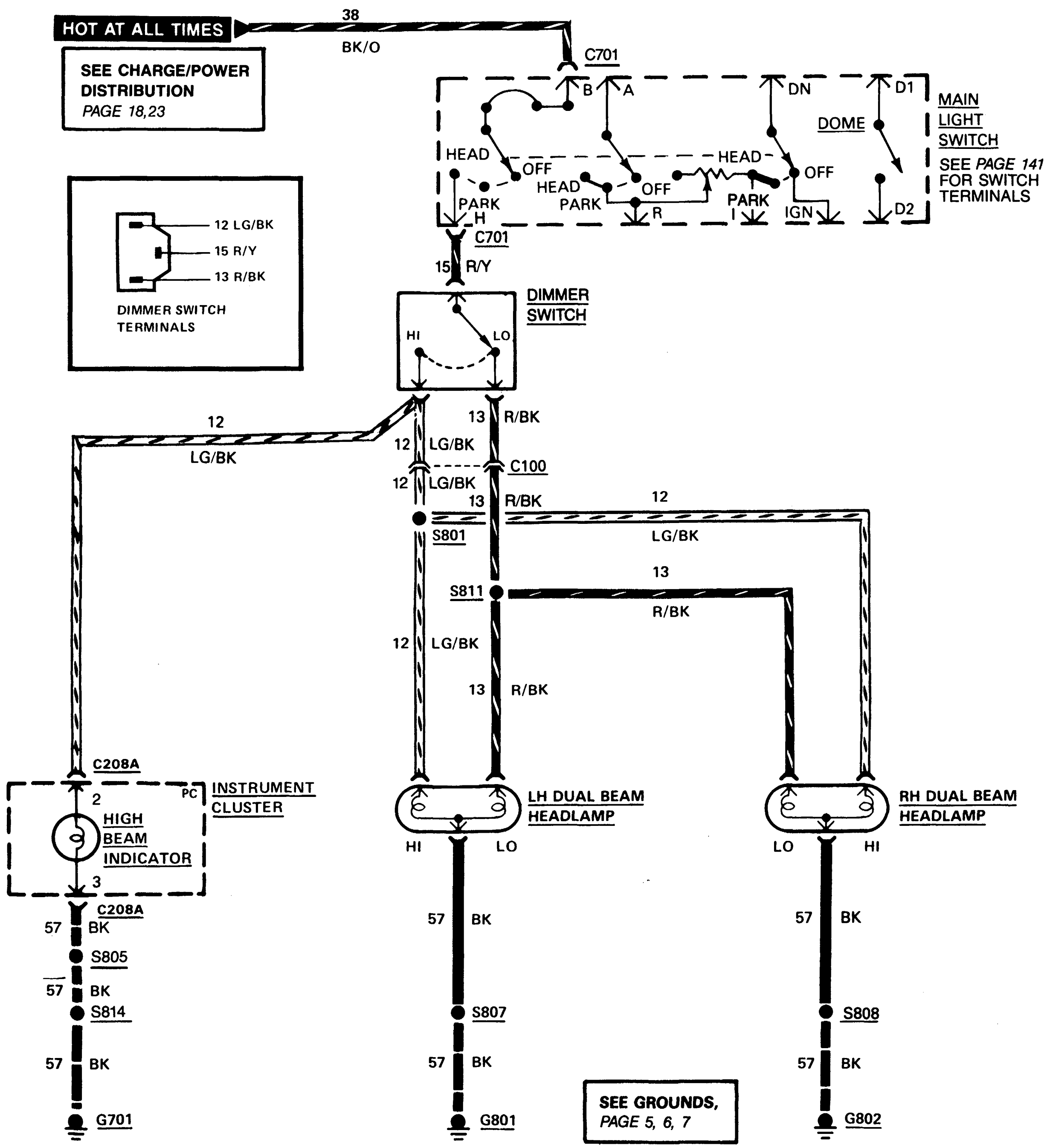
COMPONENT LOCATION

		Page-Figure
Cooling Fan Motor	RH inner fender	—
Injector Blower Relay	Behind I/P near fuse panel	—
Cooling Fan Temperature Switch	Clipped to fuel rail near number one fuel injector	134-2

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Cooling Fan doesn't operate	• No voltage at Y/LB wire of Injector Blower Relay	• Check wiring and Fuse 16.
	• No or poor continuity of BK wire from Cooling Fan Motor to G802	• Check for loose connection at ground and open in BK wire.
	• No voltage at Cooling Fan Motor	• Check for open in PK/W wire between Injector Blower Relay and Cooling Fan Motor.
	• Inoperative Cooling Fan Motor	• Apply voltage and ground to motor. If motor does not operate, replace with known good motor.
	• Inoperative Cooling Fan Temperature Switch	• Bypass switch by shorting across connector terminals. If motor operates, replace switch.


HOT AT ALL TIMES
38
BK/O
SEE CHARGE/POWER DISTRIBUTION PAGE 18,23
C701
B
A
DN
D1
MAIN LIGHT SWITCH
DOME
HEAD
OFF
HEAD
OFF
HEAD
PARK
OFF
PARK
PARK
H
R
I
IGN
D2
SEE PAGE 141 FOR SWITCH TERMINALS
C701
15 R/Y
12 LG/BK
15 R/Y
13 R/BK
DIMMER SWITCH TERMINALS
DIMMER SWITCH
HI
LO
12
LG/BK
13 R/BK
12 LG/BK
C100
12 LG/BK
13 R/BK
12
LG/BK
S801
13
S811
R/BK
12 LG/BK
13 R/BK
C208A
2
PC
INSTRUMENT CLUSTER
HIGH BEAM INDICATOR
3
C208A
57 BK
S805
57 BK
S814
57 BK
G701
LH DUAL BEAM HEADLAMP
HI
LO
57 BK
S807
57 BK
G801
RH DUAL BEAM HEADLAMP
LO
HI
57 BK
S808
57 BK
G802
SEE GROUNDS, PAGE 5, 6, 7

HOW THE CIRCUIT WORKS

Battery voltage is applied at all times through **Fuse Link J** to the **Main Light Switch.** When the **Main Light Switch** is pulled to HEAD, voltage is applied through the **Light Switch** and the **Dimmer Switch** to the **Headlamps.** The **Headlamps** will operate in either HI or LO Beam depending upon the position of the **Dimmer Switch.** The **Headlamps** are permanently grounded through **G801** and **G802.**

When the **Dimmer Switch** is in HI, voltage is also applied to the **High Beam Indicator.** The Indicator is permanently grounded through **G701.**

Refer to section 32-01 of the shop manual.

COMPONENT LOCATION

		Page-Figure
Main Light Switch	LH side of I/P	102-2
Refer to Component Testing	Page 141 for additional testing details.	
Dimmer Switch	On floor pan LH side of cab	—

Refer to the Location Index in the back of the manual for connector, ground, diode, and splice description and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• No headlamps, but park lamps function	• No voltage at R/Y wire of Dimmer Switch	• Check continuity of wire and Light Switch/replace or repair
	• No voltage at R/BK wire of Dimmer Switch	• Repair/Replace Switch
• No HI or LO Beam on one side	• Poor ground connection on affected side	• Clean/Tighten

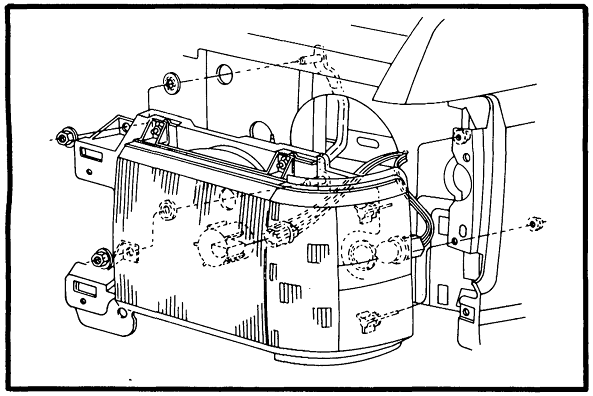
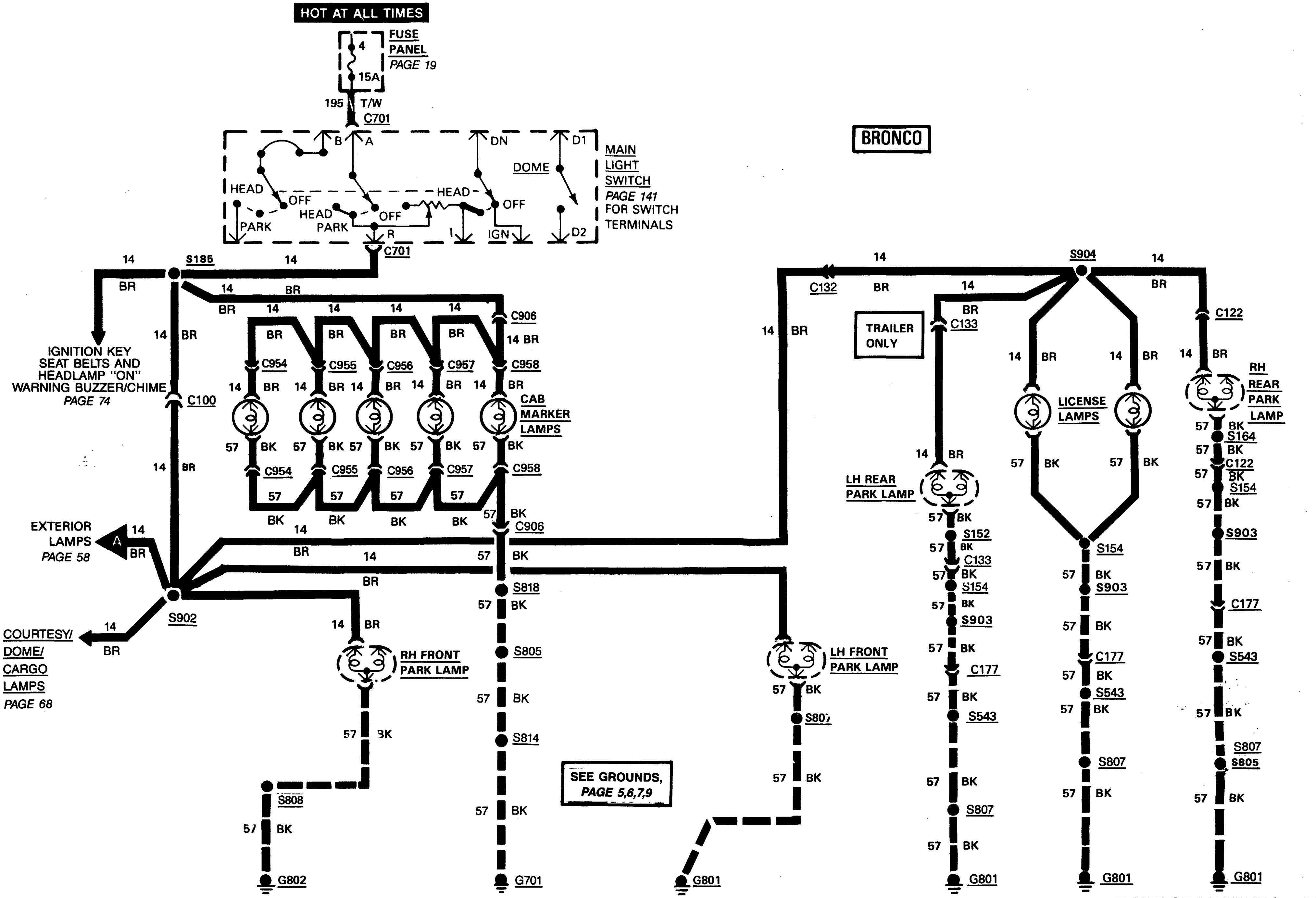
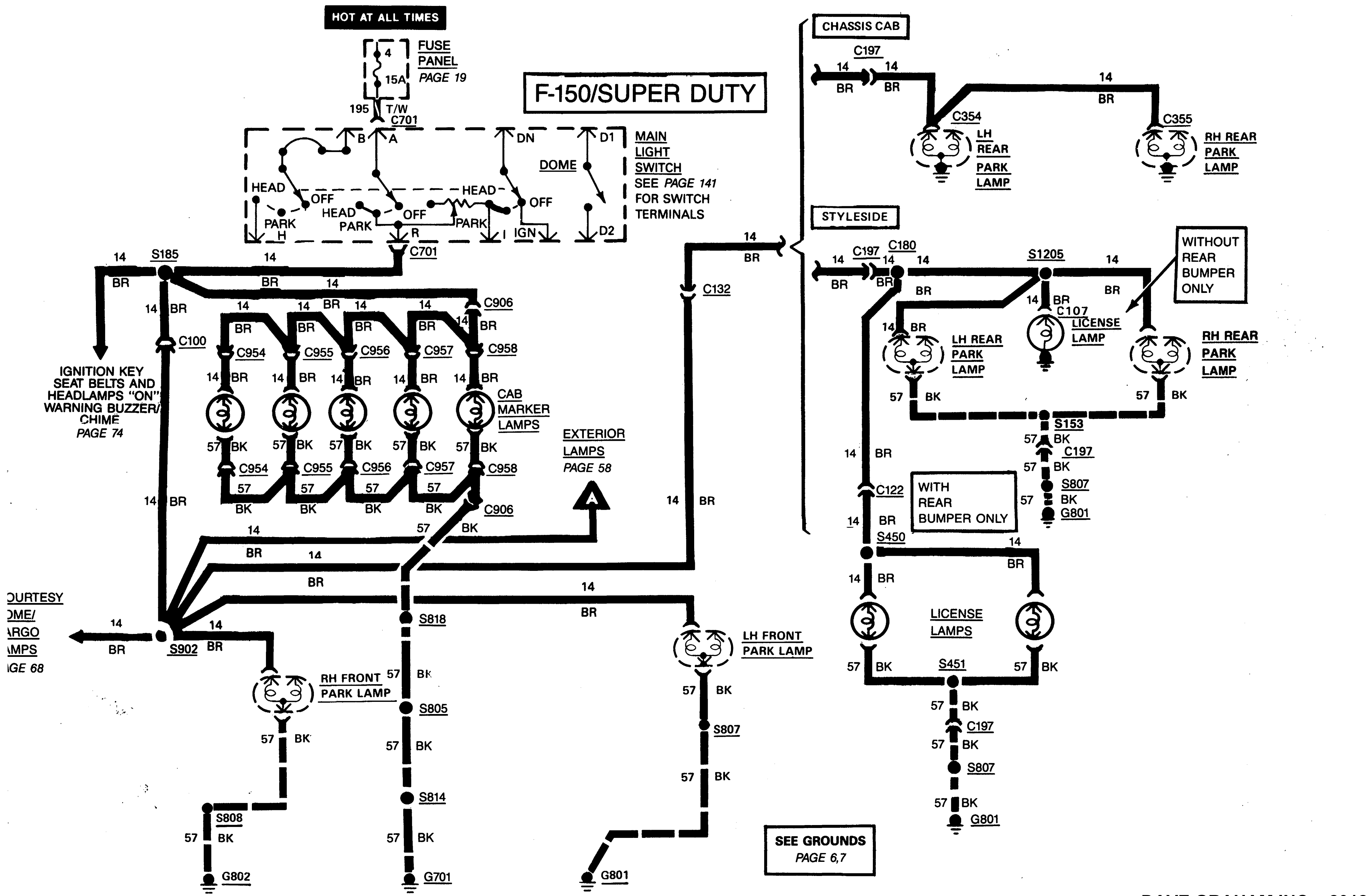
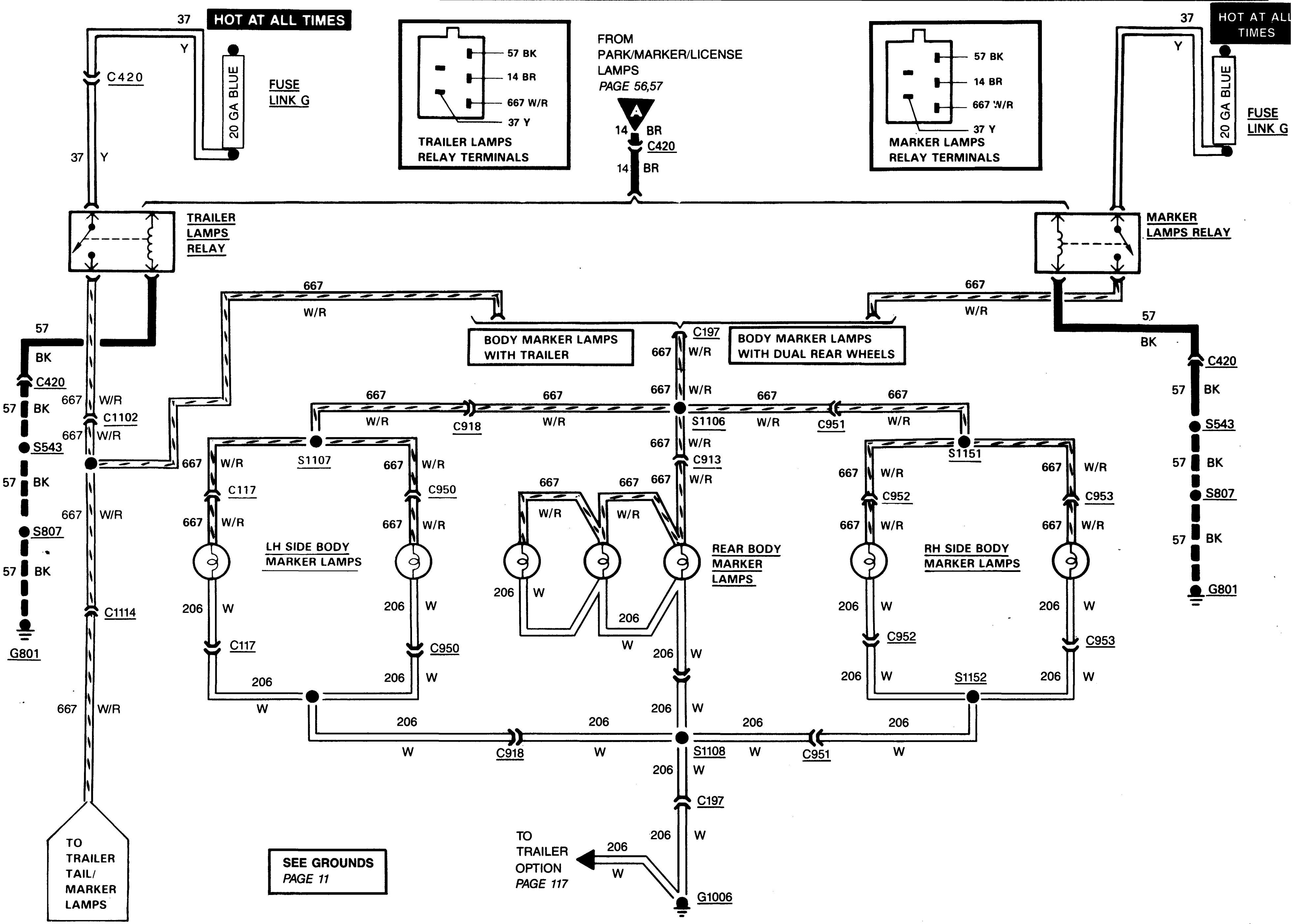


Figure 1 — L.H. Headlamp Assembly


HOT AT ALL TIMES
FUSE PANEL PAGE 19
4
15A
195 T/W
C701
B A DN D1
DOME
MAIN LIGHT SWITCH PAGE 141 FOR SWITCH TERMINALS
HEAD OFF PARK HEAD PARK OFF HEAD OFF
R I IGN D2
BRONCO
S185
14 BR
IGNITION KEY SEAT BELTS AND HEADLAMP "ON" WARNING BUZZER/CHIME PAGE 74
C100
C906
C954 C955 C956 C957 C958
CAB MARKER LAMPS
57 BK
EXTERIOR LAMPS PAGE 58
A
S902
COURTESY/ DOME/ CARGO LAMPS PAGE 68
RH FRONT PARK LAMP
S818
S805
S814
S808
G802
G701
SEE GROUNDS, PAGE 5,6,7,9
S904
C132
TRAILER ONLY
C133
C122
LICENSE LAMPS
RH REAR PARK LAMP
LH REAR PARK LAMP
LH FRONT PARK LAMP
S152
S154
S903
C177
S543
S807
S164
G801


HOT AT ALL TIMES
FUSE PANEL PAGE 19
15A
F-150/SUPER DUTY
MAIN LIGHT SWITCH SEE PAGE 141 FOR SWITCH TERMINALS
HEAD
OFF
PARK
DOME
IGN
C701
S185
C906
C954
C955
C956
C957
C958
CAB MARKER LAMPS
C100
IGNITION KEY SEAT BELTS AND HEADLAMPS "ON" WARNING BUZZER/ CHIME PAGE 74
EXTERIOR LAMPS PAGE 58
C132
S902
RH FRONT PARK LAMP
LH FRONT PARK LAMP
S818
S805
S814
S807
S808
G802
G701
G801
CHASSIS CAB
C197
C354
LH REAR PARK LAMP
C355
RH REAR PARK LAMP
STYLESIDE
C180
S1205
C107
LICENSE LAMP
WITHOUT REAR BUMPER ONLY
S153
WITH REAR BUMPER ONLY
C122
S450
LICENSE LAMPS
S451
SEE GROUNDS PAGE 6,7


HOT AT ALL TIMES
37
Y
C420
20 GA BLUE
FUSE LINK G
57 BK
14 BR
667 W/R
37 Y
TRAILER LAMPS RELAY TERMINALS
FROM PARK/MARKER/LICENSE LAMPS
PAGE 56,57
A
14 BR
C420
MARKER LAMPS RELAY TERMINALS
TRAILER LAMPS RELAY
MARKER LAMPS RELAY
667 W/R
57 BK
C1102
S543
S807
C1114
G801
BODY MARKER LAMPS WITH TRAILER
BODY MARKER LAMPS WITH DUAL REAR WHEELS
C197
S1106
C918
C951
C913
S1107
S1151
C117
C950
C952
C953
LH SIDE BODY MARKER LAMPS
REAR BODY MARKER LAMPS
RH SIDE BODY MARKER LAMPS
206 W
S1152
S1108
TO TRAILER TAIL/ MARKER LAMPS
SEE GROUNDS
PAGE 11
TO TRAILER OPTION
PAGE 117
G1006

HOW THE CIRCUIT WORKS

When the **Main Light Switch** is turned to PARK or HEAD, battery voltage is applied through **Fuse 4** to the **Park, Marker,** and **License Lamps.** All of these lamps are permanently grounded and light whenever voltage is applied.

Refer to section 32-01 of the shop manual.

COMPONENT LOCATION

		Page-Figure
Fuse Link G	Near starter relay	—
Marker Lamp Relay	Attached to dash panel	—
Trailer Lamp Relay	Attached to dash panel	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• No exterior lamps light	• No voltage at T/W wire of Main Light Switch • C701 is loose • No voltage at BR wire or lamps • Defective Main Light Switch	• Check Fuse 4 and wiring • Tighten/Replace • Check for open in BR wire • Replace switch as required
• One lamp does not light	• Blown blub • Frayed or damaged wires or loose wires	• Replace bulb as required • Repair as required

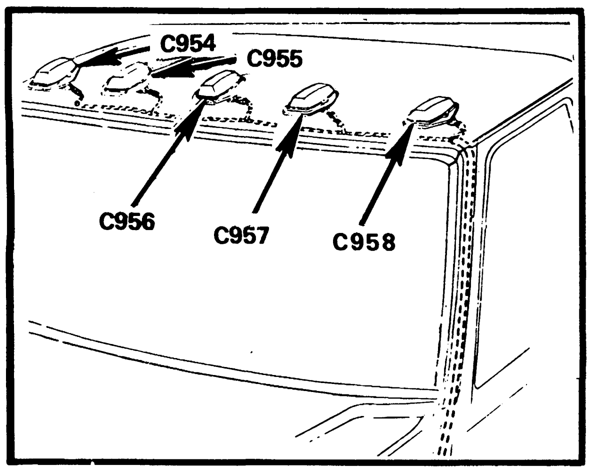


Figure 1 - Top Of Cab

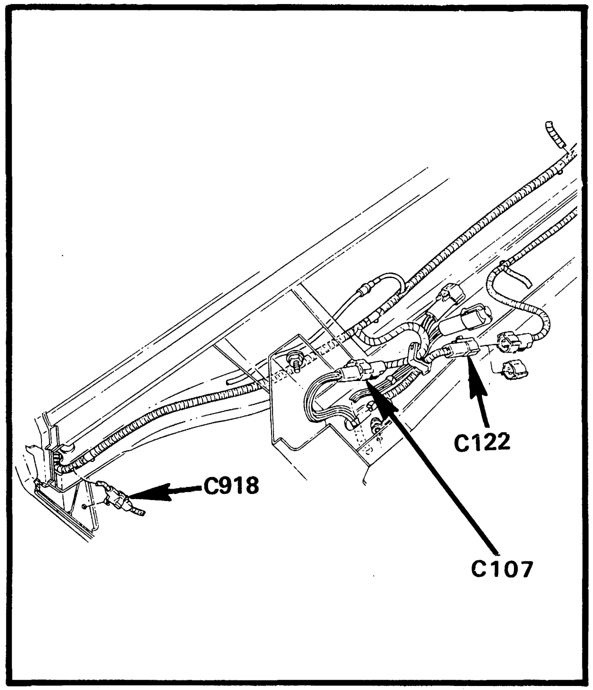


Figure 2 — LH Side Of Rear Crossmember

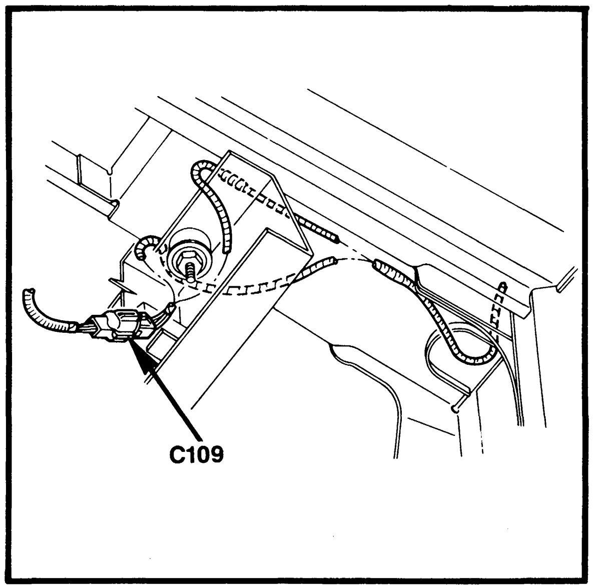


Figure 3 — RH Side Of Rear Crossmember

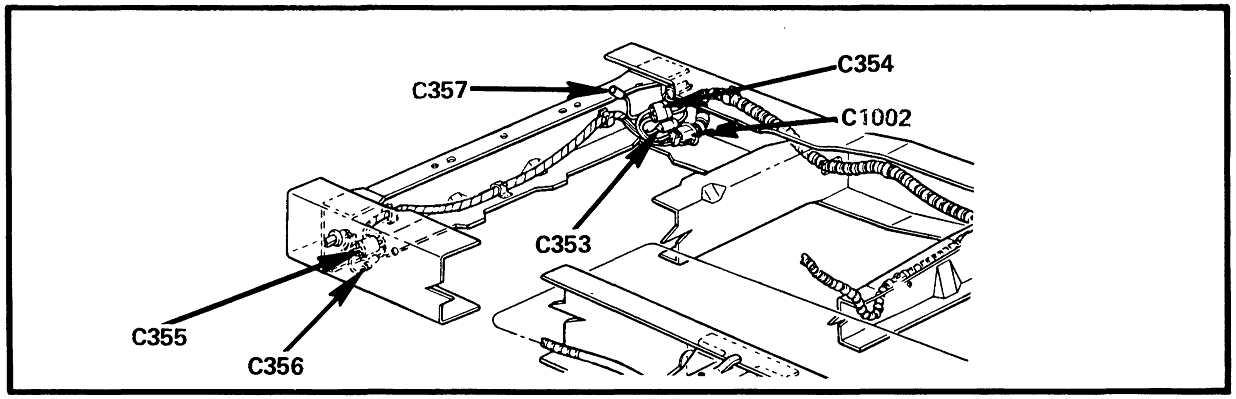


Figure 4 — Rear Frame Crossmember

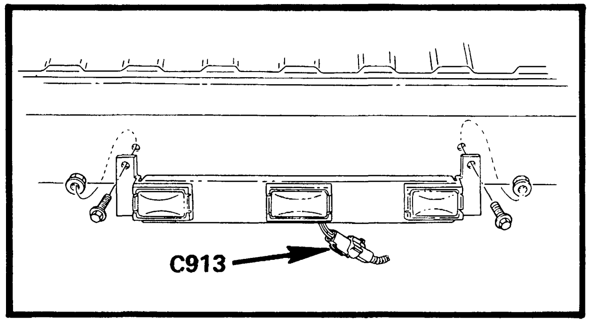


Figure 5 — Center Of Rear Bumper

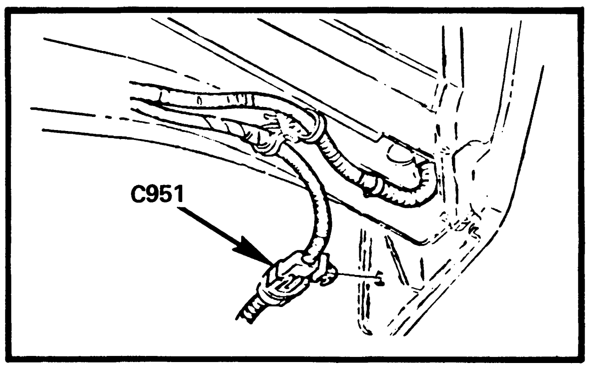


Figure 6 — RH Side Of Rear Crossmember

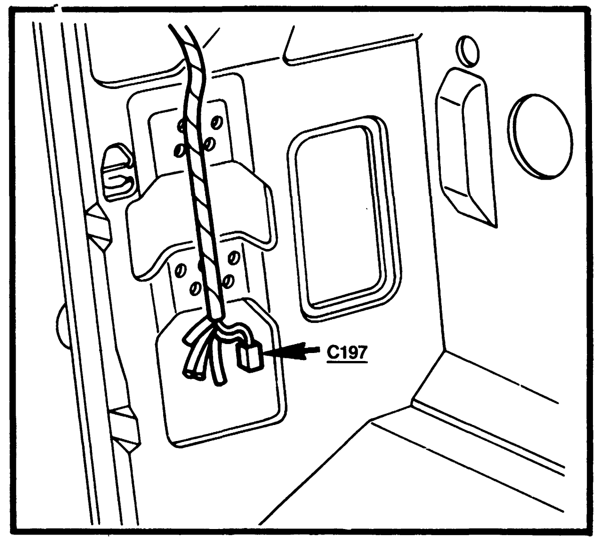


Figure 7 — Lower LH Cowl Area

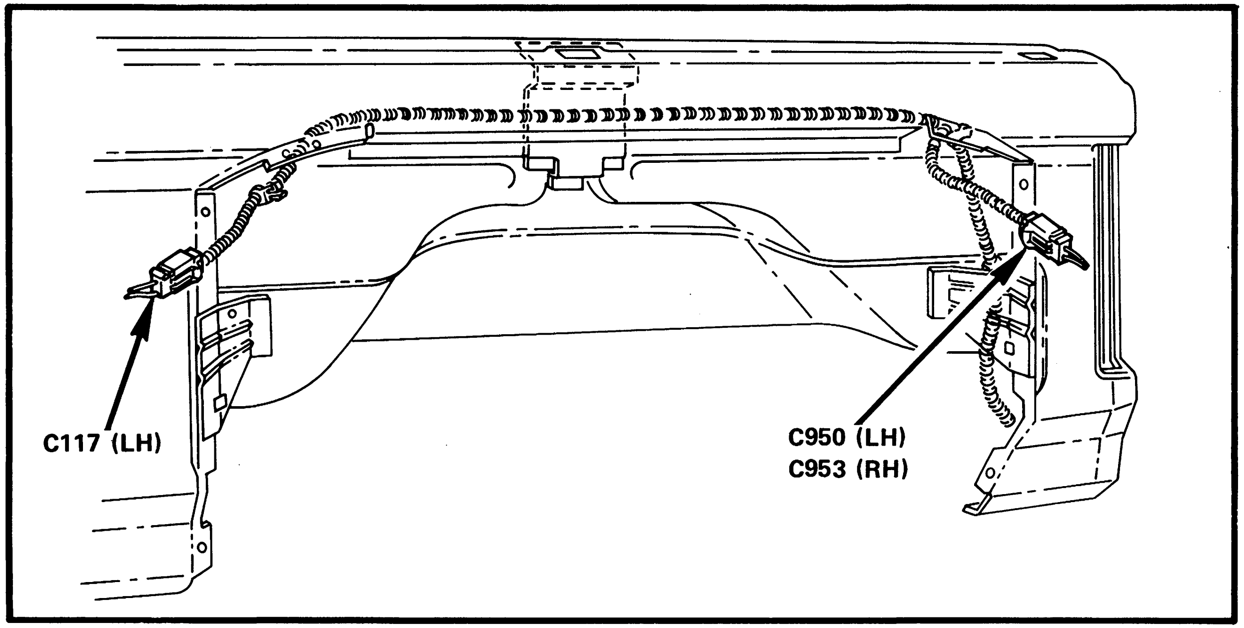


Figure 8—LH Rear Fender Well for Dual Wheels (RH Similar)

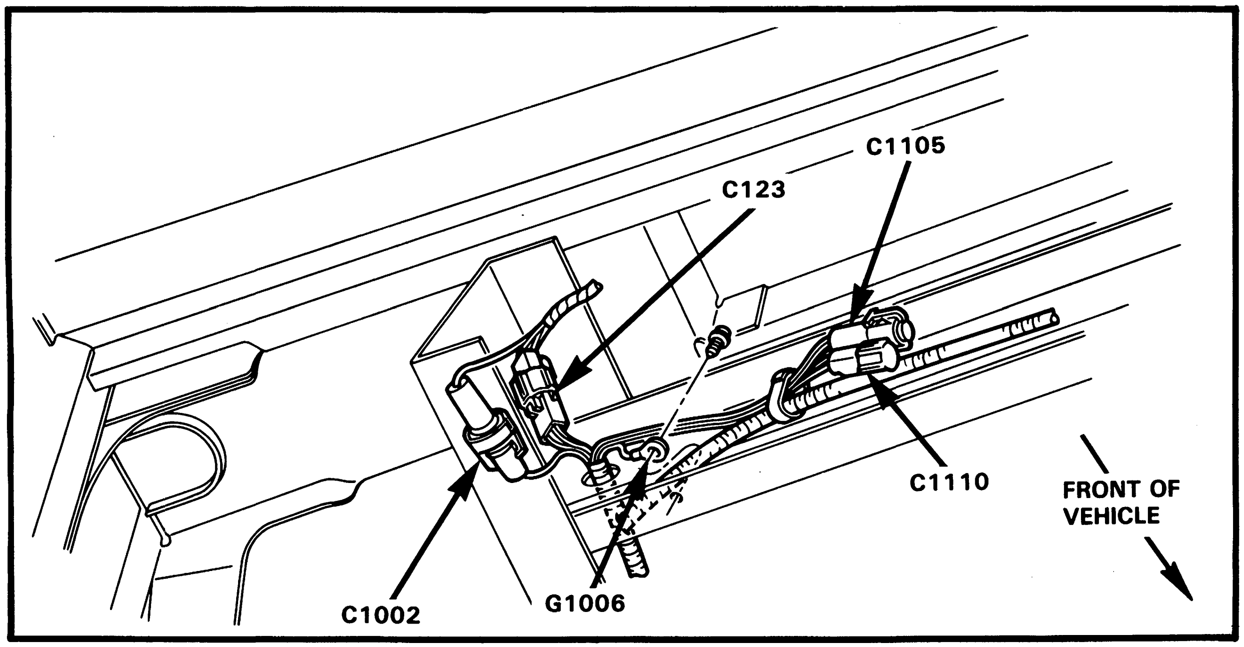
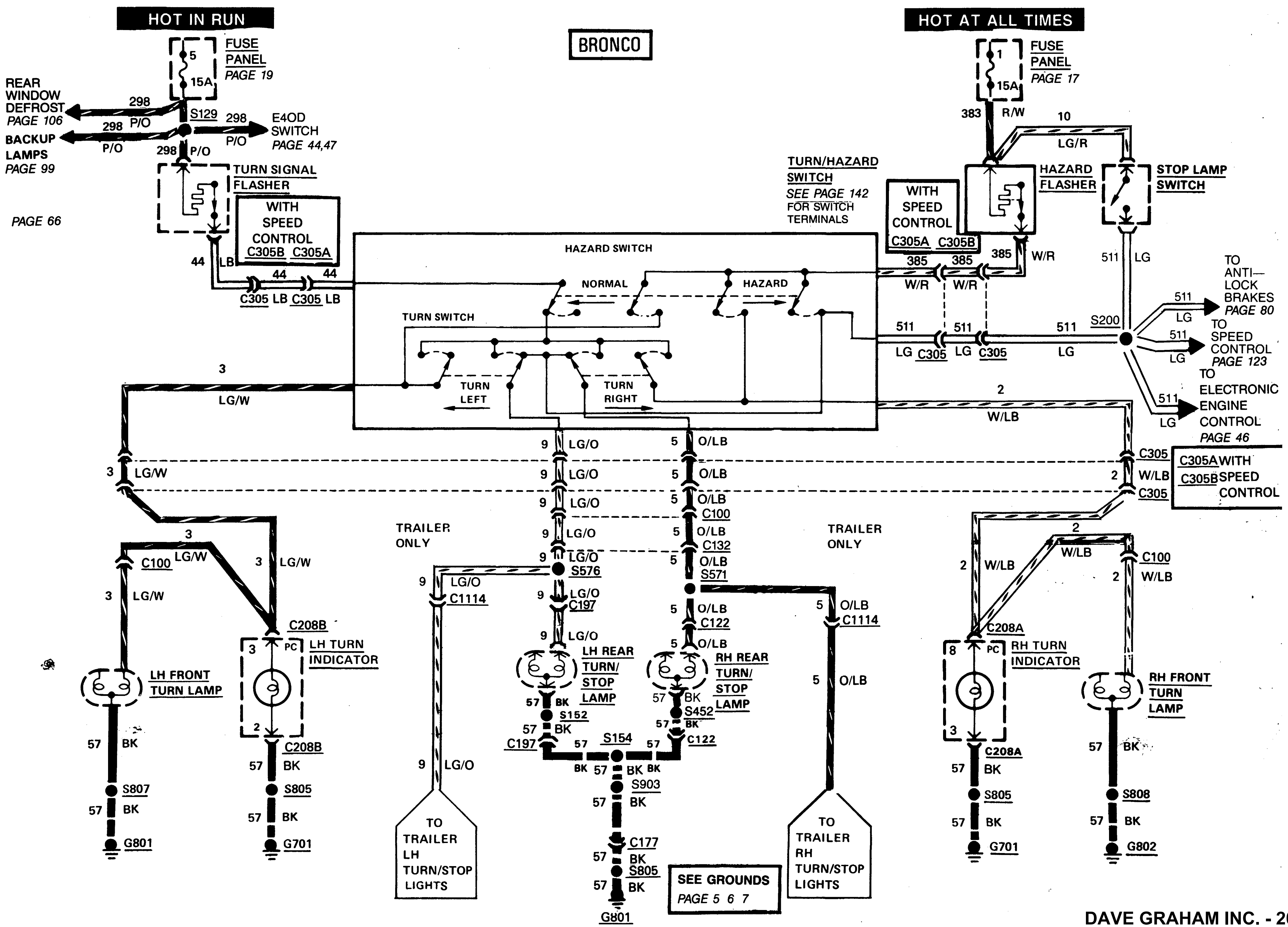
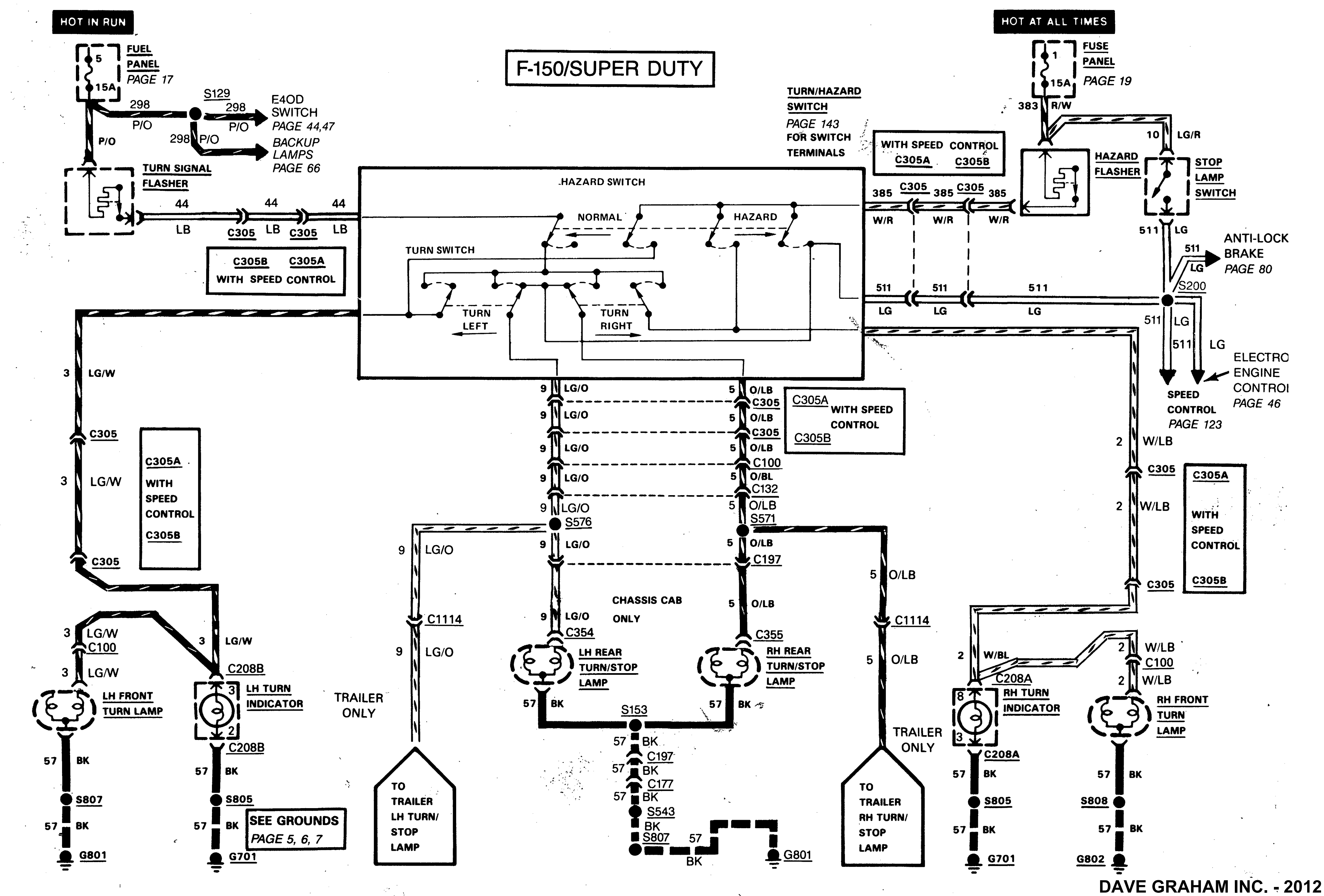


Figure 9—Rear LH Side Frame Crossmember


HOT IN RUN
BRONCO
HOT AT ALL TIMES
FUSE PANEL PAGE 19
FUSE PANEL PAGE 17
REAR WINDOW DEFROST PAGE 106
BACKUP LAMPS PAGE 99
PAGE 66
E4OD SWITCH PAGE 44,47
TURN SIGNAL FLASHER
WITH SPEED CONTROL C305B C305A
TURN/HAZARD SWITCH SEE PAGE 142 FOR SWITCH TERMINALS
WITH SPEED CONTROL C305A C305B
HAZARD FLASHER
STOP LAMP SWITCH
HAZARD SWITCH
NORMAL
HAZARD
TURN SWITCH
TURN LEFT
TURN RIGHT
TO ANTI-LOCK BRAKES PAGE 80
TO SPEED CONTROL PAGE 123
TO ELECTRONIC ENGINE CONTROL PAGE 46
C305A WITH C305B SPEED CONTROL
TRAILER ONLY
TRAILER ONLY
LH FRONT TURN LAMP
LH TURN INDICATOR
LH REAR TURN/STOP LAMP
RH REAR TURN/STOP LAMP
RH TURN INDICATOR
RH FRONT TURN LAMP
TO TRAILER LH TURN/STOP LIGHTS
TO TRAILER RH TURN/STOP LIGHTS
SEE GROUNDS PAGE 5 6 7
G801
G701
G801
G701
G802


HOT IN RUN
FUEL PANEL PAGE 17
5
15A
298
P/O
S129
E4OD SWITCH PAGE 44,47
BACKUP LAMPS PAGE 66
TURN SIGNAL FLASHER
44
LB
C305
C305B C305A WITH SPEED CONTROL
F-150/SUPER DUTY
HAZARD SWITCH
NORMAL
HAZARD
TURN SWITCH
TURN LEFT
TURN RIGHT
TURN/HAZARD SWITCH PAGE 143 FOR SWITCH TERMINALS
WITH SPEED CONTROL C305A C305B
HOT AT ALL TIMES
FUSE PANEL PAGE 19
1
383 R/W
HAZARD FLASHER
10 LG/R
STOP LAMP SWITCH
385 W/R
511 LG
ANTI-LOCK BRAKE PAGE 80
S200
ELECTRO ENGINE CONTROI PAGE 46
SPEED CONTROL PAGE 123
3 LG/W
C305A WITH SPEED CONTROL C305B
9 LG/O
5 O/LB
C305A WITH SPEED CONTROL C305B
C100
C132
S576
S571
C197
CHASSIS CAB ONLY
C354
C355
LH REAR TURN/STOP LAMP
RH REAR TURN/STOP LAMP
C1114
TRAILER ONLY
TO TRAILER LH TURN/ STOP LAMP
TO TRAILER RH TURN/ STOP LAMP
2 W/LB
C208B
C208A
LH FRONT TURN LAMP
LH TURN INDICATOR
RH TURN INDICATOR
RH FRONT TURN LAMP
57 BK
S807
S805
S153
S543
S808
C177
G801
G701
G802
SEE GROUNDS PAGE 5, 6, 7

HOW THE CIRCUIT WORKS

Turn Signals and Hazard Flashers

With the Ignition Switch in RUN, voltage is applied through **Fuse 5** and the **Turn Signal Flasher** to the **Turn/Hazard Switch.** When the **Turn/Hazard Switch** is closed for LH, RH, or Hazard Indicator operation, voltage is applied through the Switch to the lamps. All of these lamps are permanently grounded.

Stoplamps

Voltage is applied through **Fuse 1** to the **Stoplamp Switch.** When the **Brake Pedal** is pressed, the **Stoplamp Switch** closes, and voltage is applied through the closed contacts of the **Turn/Hazard Switch** to the **Stoplamps.** These lamps are permanently grounded.

COMPONENT LOCATION

		Page-Figure
Hazard Flasher	In rear of fuse panel	—
Stoplamp Switch	Mounted to bracket at top of brake pedal	79-2
Turn Signal Flasher	In front of fuse panel	16-1
Turn/Hazard Switch	Mounted in steering column	—

Refer to Component Testing Page 142 for additional testing details.

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

Refer to section 32-01 of the shop manual.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Hazard Flashers do not work	• No voltage at R/W Hazard Flasher wire	• Check Fuse 1 and wiring
	• Defective Hazard Flasher	• Replace with known good flasher
	• No voltage at C305 W/R wire	• Repair open in wiring
	• Defective Turn/Hazard Switch	• Replace with known good switch
• No Turn Indicators work	• No voltage at P/O wire of Turn Signal Flasher	• Check Fuse 5 and wiring
	• No voltage at C305 LB wire	• Repair open in wiring
	• Defective Turn Signal Flasher	• Replace with known good flasher
	• Defective Turn/Hazard Switch	• Replace as required
• No Stoplamps	• No voltage at LG/R wire of Stoplamp Switch	• Check Fuse 1 and wiring
	• Defective Stoplamp Switch	• Replace with known good switch

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• One Turn Indicator not working	• Blown bulb • No voltage at socket • Poor ground • Defective Turn/Hazard Switch	• Replace bulb • Repair opens in wiring • Clean or repair open in BK ground wire • Replace switch as required

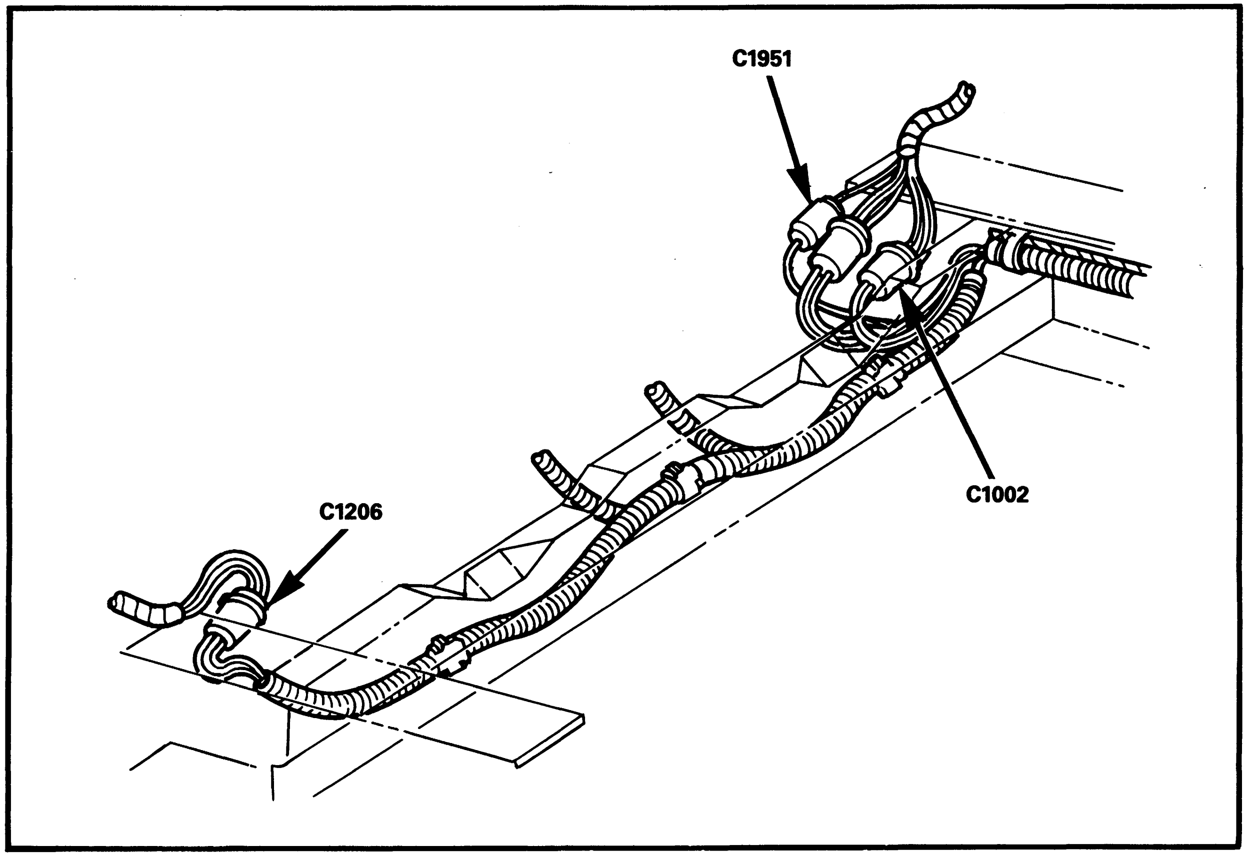
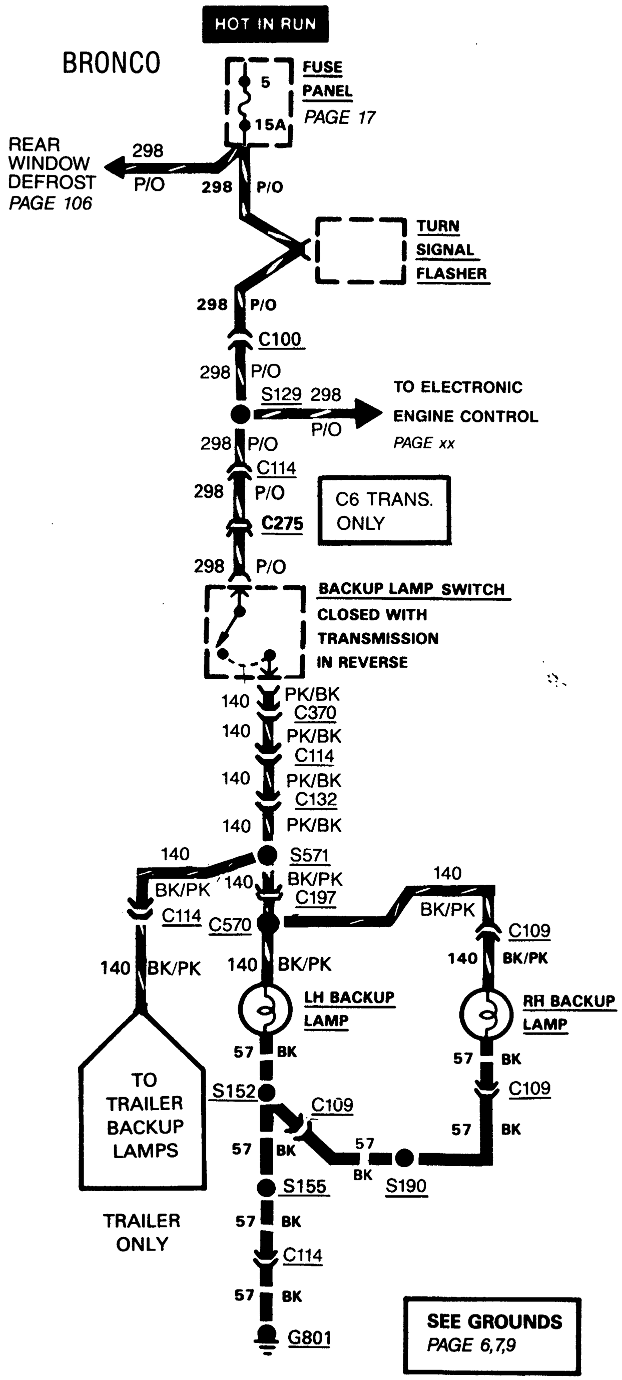
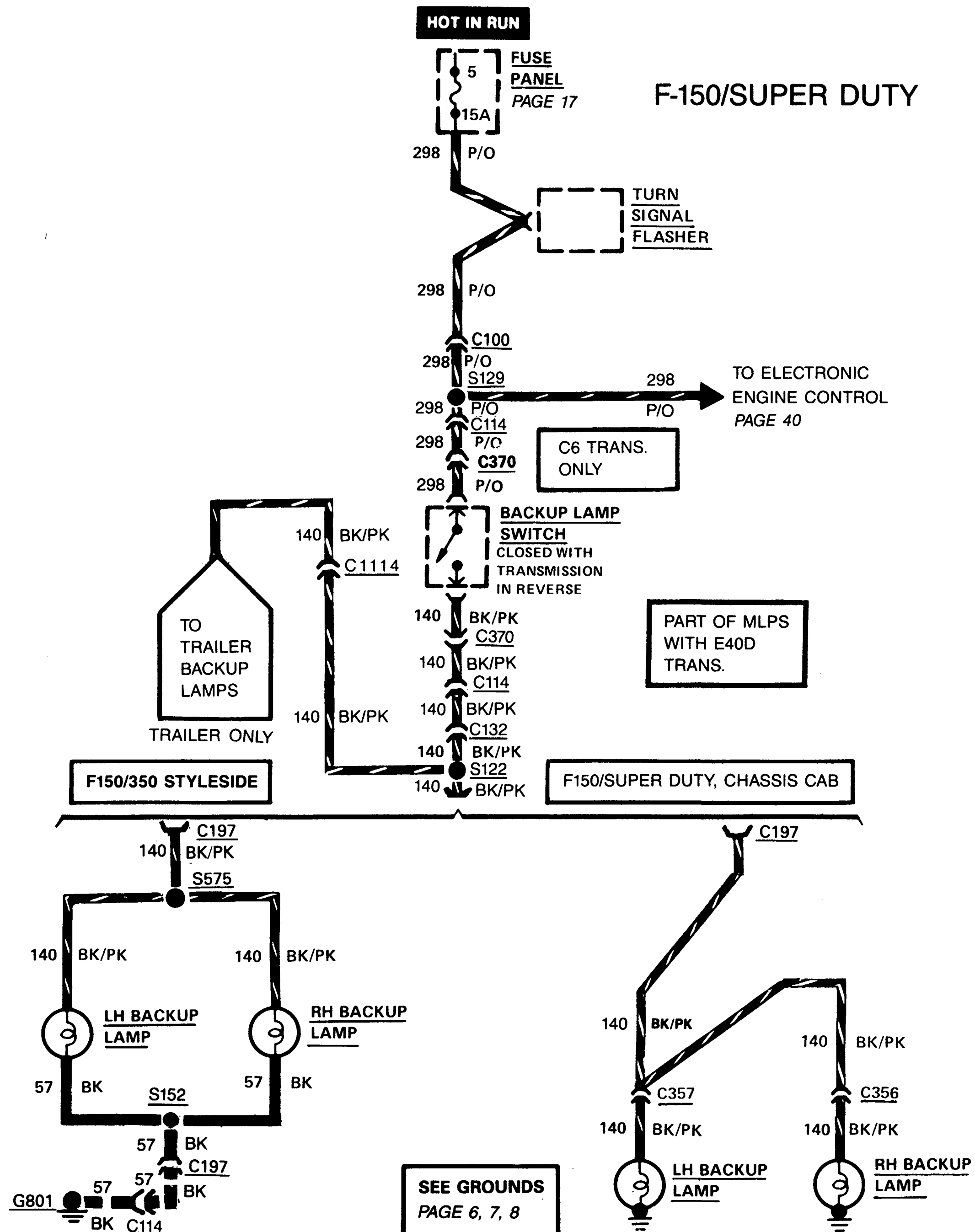


Figure 1—At Rear Crossmember


BRONCO
HOT IN RUN
5
15A
FUSE PANEL
PAGE 17
REAR WINDOW DEFROST
PAGE 106
298 P/O
TURN SIGNAL FLASHER
C100
S129
TO ELECTRONIC ENGINE CONTROL
PAGE xx
C114
C275
C6 TRANS. ONLY
BACKUP LAMP SWITCH
CLOSED WITH TRANSMISSION IN REVERSE
140 PK/BK
C370
C132
S571
140 BK/PK
C197
C570
C109
LH BACKUP LAMP
RH BACKUP LAMP
57 BK
S152
S190
S155
G801
TO TRAILER BACKUP LAMPS
TRAILER ONLY
SEE GROUNDS
PAGE 6,7,9


HOT IN RUN
5
15A
FUSE PANEL
PAGE 17
F-150/SUPER DUTY
298 P/O
TURN SIGNAL FLASHER
C100
S129
TO ELECTRONIC ENGINE CONTROL
PAGE 40
C114
C370
C6 TRANS. ONLY
BACKUP LAMP SWITCH
CLOSED WITH TRANSMISSION IN REVERSE
140 BK/PK
C1114
PART OF MLPS WITH E40D TRANS.
TO TRAILER BACKUP LAMPS
TRAILER ONLY
C132
S122
F150/350 STYLESIDE
F150/SUPER DUTY, CHASSIS CAB
C197
S575
LH BACKUP LAMP
RH BACKUP LAMP
57 BK
S152
G801
C114
C357
C356
SEE GROUNDS
PAGE 6, 7, 8

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in RUN or START, battery voltage is applied through **Fuse 5** to the **Backup Lamp Switch.** When the transmission is placed in REVERSE, the **Backup Lamp Switch** closes and voltage is applied to the LH and RH **Backup Lamps.** These lamps are permanently grounded through **G801.**

Refer to section 32-01 of the shop manual.

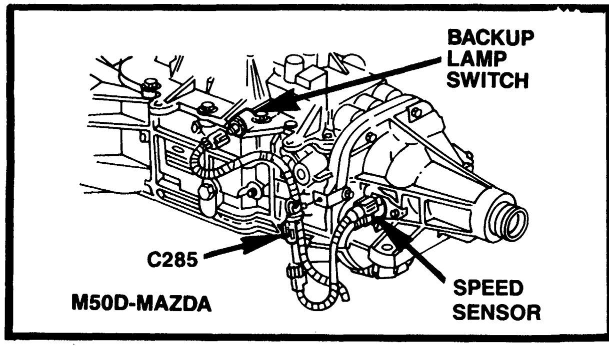
COMPONENT LOCATION

		Page-Figure
Backup Lamp Switch	Part of manual transmission assembly or neutral start switch	67-1
Turn Signal Flasher	In front of fuse panel	14-1

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• No Backup Lamps light	• No voltage at P/O wire of Backup Lamp Switch	• Check Fuse 5 and wiring for opens
	• No voltage at BK/PK wire of Backup Lamp Switch with transmission in Reverse	• Replace Backup Lamp Switch
• One Backup Lamp will not light	• Blown bulb	• Replace bulb
	• Check socket for corrosion	• Clean/Replace
	• No voltage at socket hot pin	• Repair open in BK/PK wire of socket
	• Poor ground connection from bulb	• Clean/Tighten connection or repair open in wiring
• Backup Lamps stay on	• Defective Switch	• Replace as required
	• Short to voltage	• Repair wiring



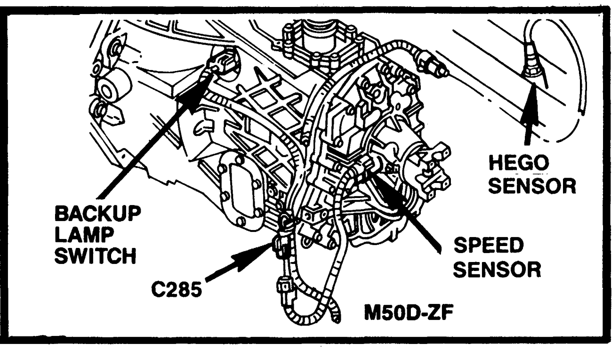
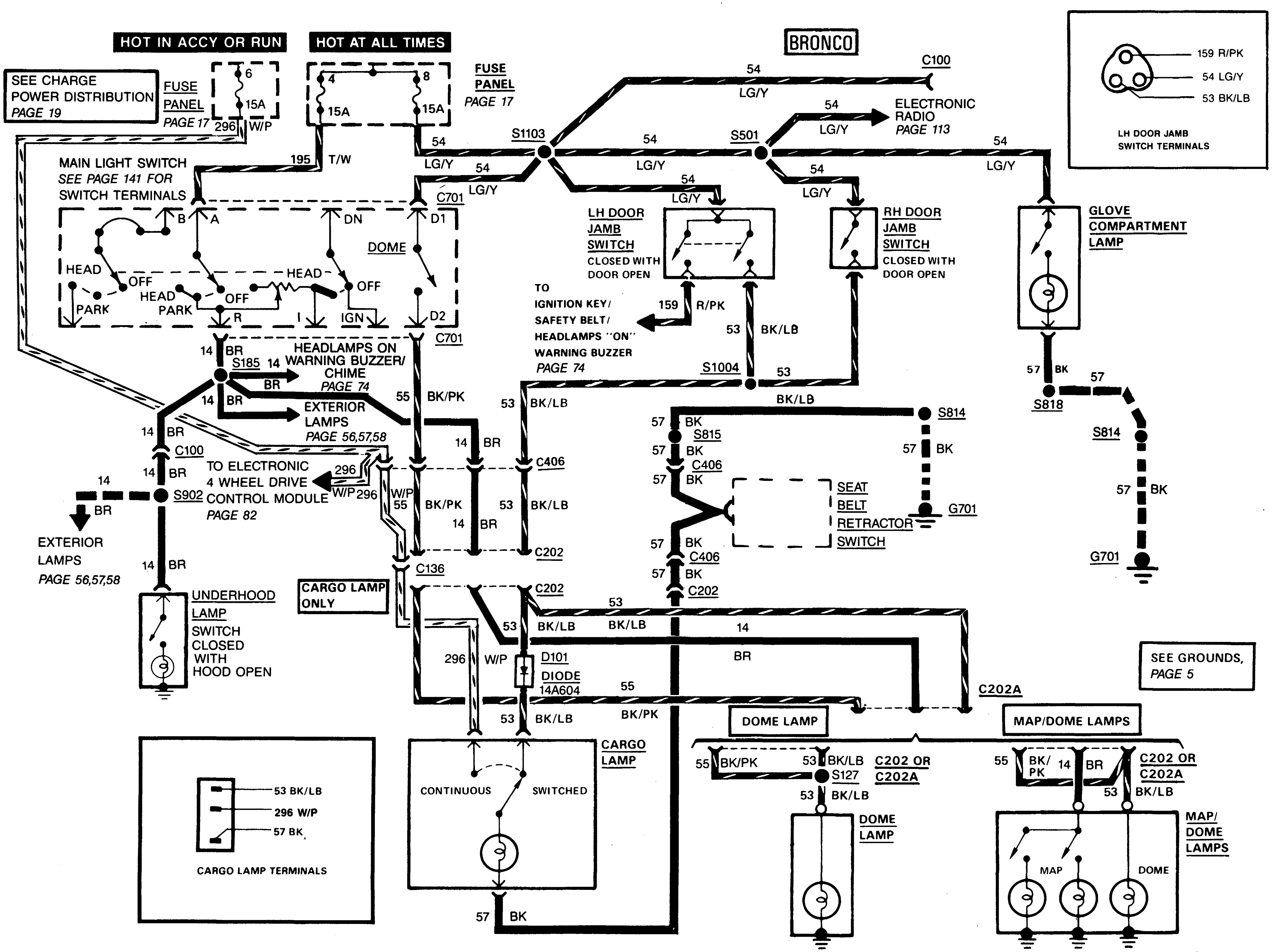
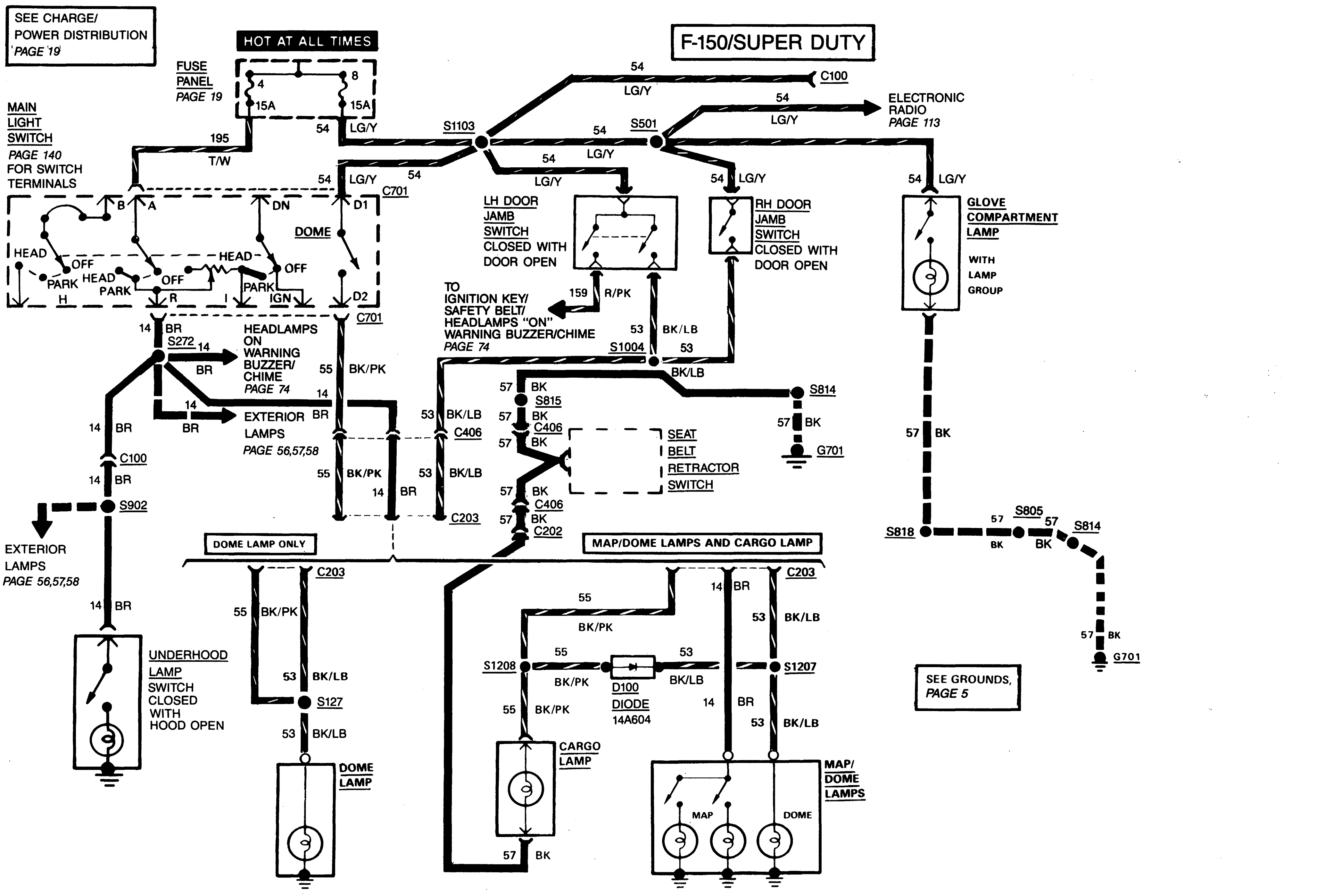


Figure 1 - Manual Transmissions

COURTESY/DOME/CARGO LAMPS




SEE CHARGE/ POWER DISTRIBUTION PAGE 19
HOT AT ALL TIMES
F-150/SUPER DUTY
FUSE PANEL PAGE 19
4 15A
8 15A
MAIN LIGHT SWITCH PAGE 140 FOR SWITCH TERMINALS
195 T/W
54 LG/Y
C100
ELECTRONIC RADIO PAGE 113
S1103
S501
C701
B A DN D1
DOME
HEAD OFF PARK H
HEAD PARK OFF
HEAD OFF PARK IGN
R I D2
LH DOOR JAMB SWITCH CLOSED WITH DOOR OPEN
RH DOOR JAMB SWITCH CLOSED WITH DOOR OPEN
GLOVE COMPARTMENT LAMP
WITH LAMP GROUP
TO IGNITION KEY/ SAFETY BELT/ HEADLAMPS "ON" WARNING BUZZER/CHIME PAGE 74
159 R/PK
53 BK/LB
S1004
14 BR
S272
HEADLAMPS ON WARNING BUZZER/ CHIME PAGE 74
55 BK/PK
EXTERIOR LAMPS PAGE 56,57,58
57 BK
S815
C406
S814
G701
SEAT BELT RETRACTOR SWITCH
C100
S902
C203
C202
EXTERIOR LAMPS PAGE 56,57,58
S818
S805
DOME LAMP ONLY
MAP/DOME LAMPS AND CARGO LAMP
S127
S1208
S1207
D100 DIODE 14A604
UNDERHOOD LAMP SWITCH CLOSED WITH HOOD OPEN
DOME LAMP
CARGO LAMP
MAP/ DOME LAMPS
MAP
DOME
SEE GROUNDS, PAGE 5

HOW THE CIRCUIT WORKS

Battery voltage is applied at all times to the **Main Lamp Switch, Door Jamb Switches, Glove Compartment Switch** and **Dome Switch** through **Fuse 4** and **Fuse 8.** Battery voltage is also applied in ACCY or RUN through **Fuse 6** to the **Cargo Lamp Switch.** When the switches are closed, voltage is applied through the switches to the lamps. All of these lamps are permanently grounded.

Refer to section 32-01 of the shop manual.

COMPONENT LOCATION

		Page-Figure
Door Jamb Switches	LH lower cowl, near fuse panel	—
Main Light Switch	LH side of I/P	102-2

Refer to Component Testing Page 141 for additional testing details.

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Cargo Lamp, Dome Lamp, Glove Compartment do not light	• No voltage at LG/Y wire of switches	• Check fuse 8 and LG/Y wire of switches
• Hoodlamps and Map Lamps do not light	• No voltage at BR wire of switches	• Check fuse 4, Main Light Switch and BR wire of switches
• Single lamp doesn't light	• Blown bulb • Socket corrosion • Defective switch	• Replace bulb • Clean/Replace • Replace switches as required

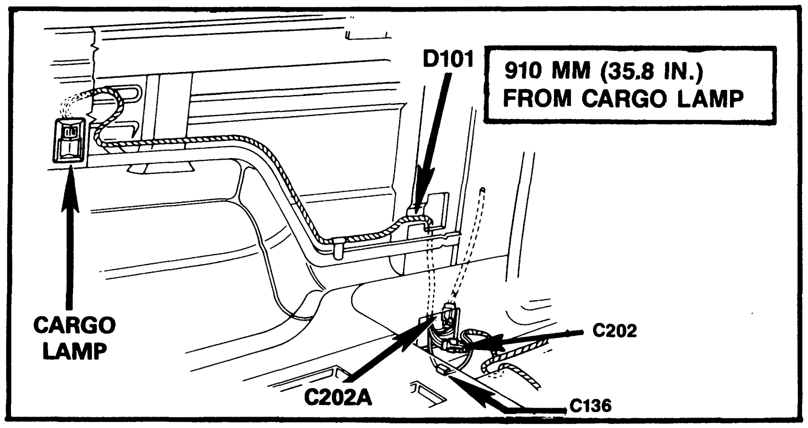


Figure 1 – Cargo Area of Bronco

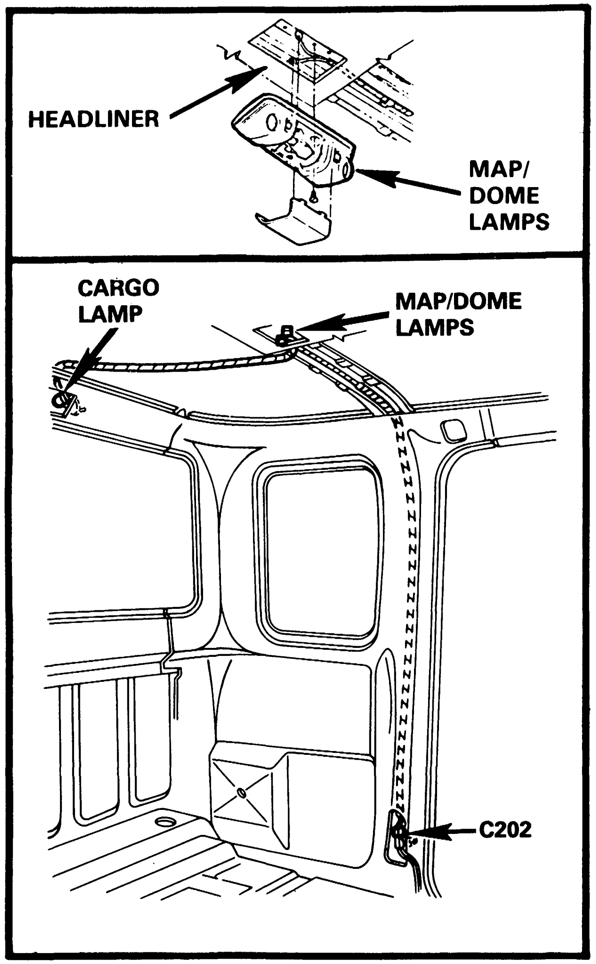


Figure 2 - LH Quarter Panel of Super Cab

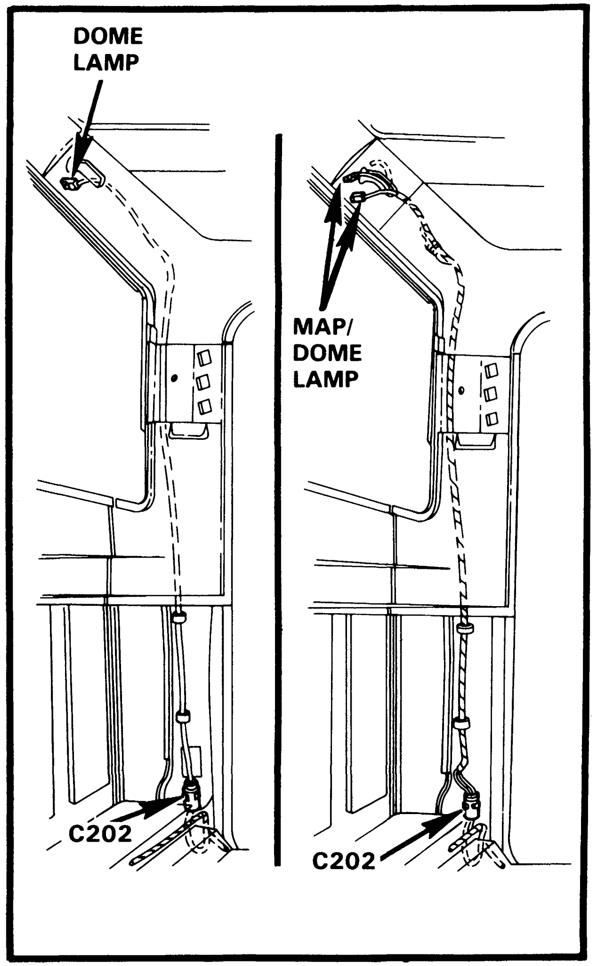
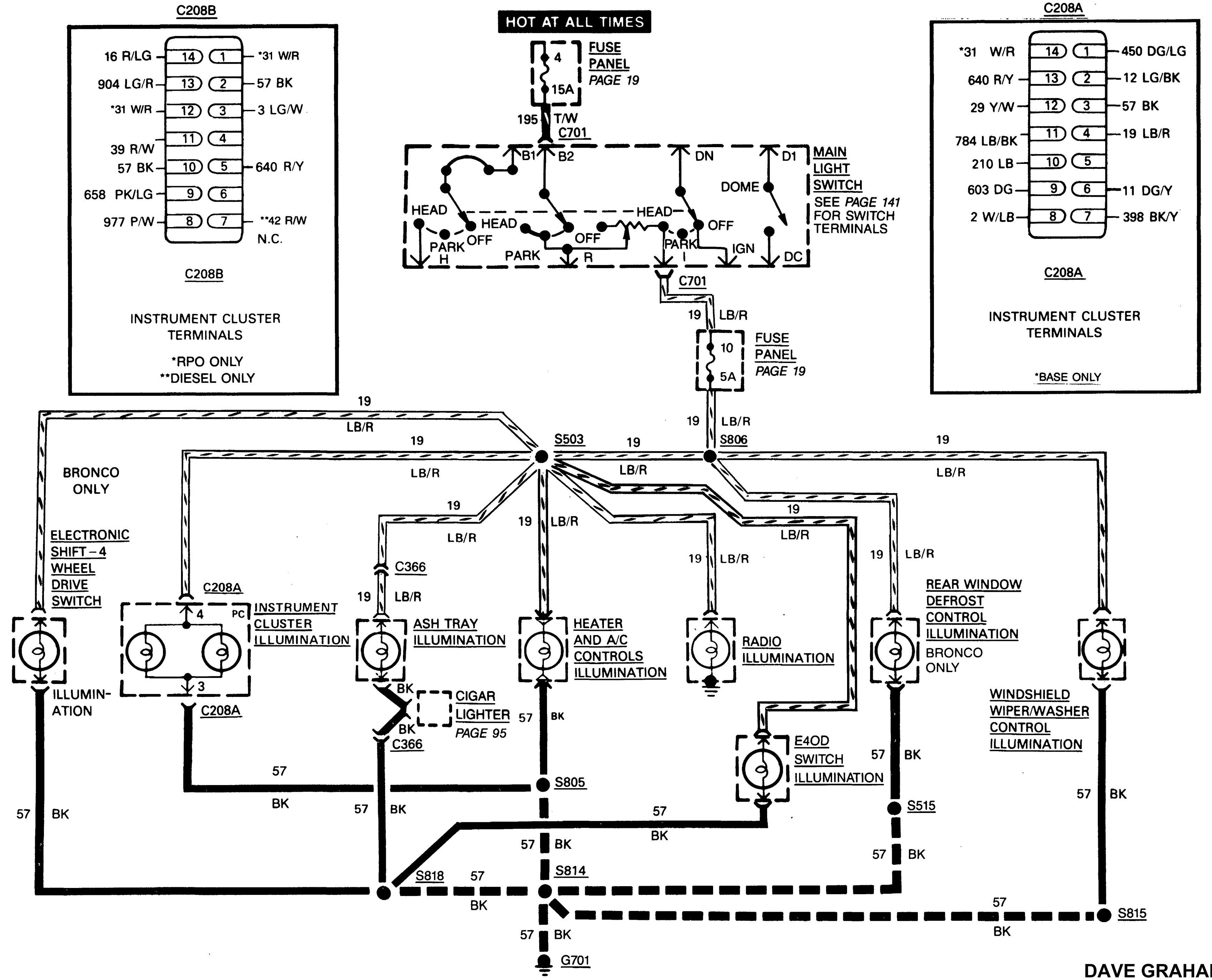


Figure 3 - LH Quarter Panel of Regular Cab


C208B
16 R/LG
904 LG/R
*31 W/R
39 R/W
57 BK
658 PK/LG
977 P/W
*31 W/R
57 BK
3 LG/W
640 R/Y
**42 R/W
N.C.
C208B
INSTRUMENT CLUSTER TERMINALS
*RPO ONLY
**DIESEL ONLY
HOT AT ALL TIMES
FUSE PANEL PAGE 19
15A
195 T/W
C701
MAIN LIGHT SWITCH SEE PAGE 141 FOR SWITCH TERMINALS
HEAD
PARK
OFF
DOME
IGN
DC
C701
19 LB/R
FUSE PANEL PAGE 19
5A
C208A
*31 W/R
640 R/Y
29 Y/W
784 LB/BK
210 LB
603 DG
2 W/LB
450 DG/LG
12 LG/BK
57 BK
19 LB/R
11 DG/Y
398 BK/Y
C208A
INSTRUMENT CLUSTER TERMINALS
*BASE ONLY
S503
S806
BRONCO ONLY
ELECTRONIC SHIFT-4 WHEEL DRIVE SWITCH
ILLUMINATION
C208A
INSTRUMENT CLUSTER ILLUMINATION
C366
ASH TRAY ILLUMINATION
CIGAR LIGHTER PAGE 95
HEATER AND A/C CONTROLS ILLUMINATION
RADIO ILLUMINATION
E4OD SWITCH ILLUMINATION
REAR WINDOW DEFROST CONTROL ILLUMINATION
BRONCO ONLY
WINDSHIELD WIPER/WASHER CONTROL ILLUMINATION
S805
S515
S818
S814
S815
57 BK
G701

HOW THE CIRCUIT WORKS

Battery voltage is applied at all times through **Fuse 4** to the **Main Light Switch.** When the **Main Light Switch** is turned to PARK or HEAD, voltage is applied through the switch to the **Instrument Illumination Lamps.** The amount of voltage, and in turn the intensity of the lamps, can be adjusted by rotating the **Dimmer Switch** of the **Main Light Switch.**

Refer to section 32-01 of the shop manual.

COMPONENT LOCATION

		Page-Figure
Main Light Switch	I/P, left of steering column	102-2

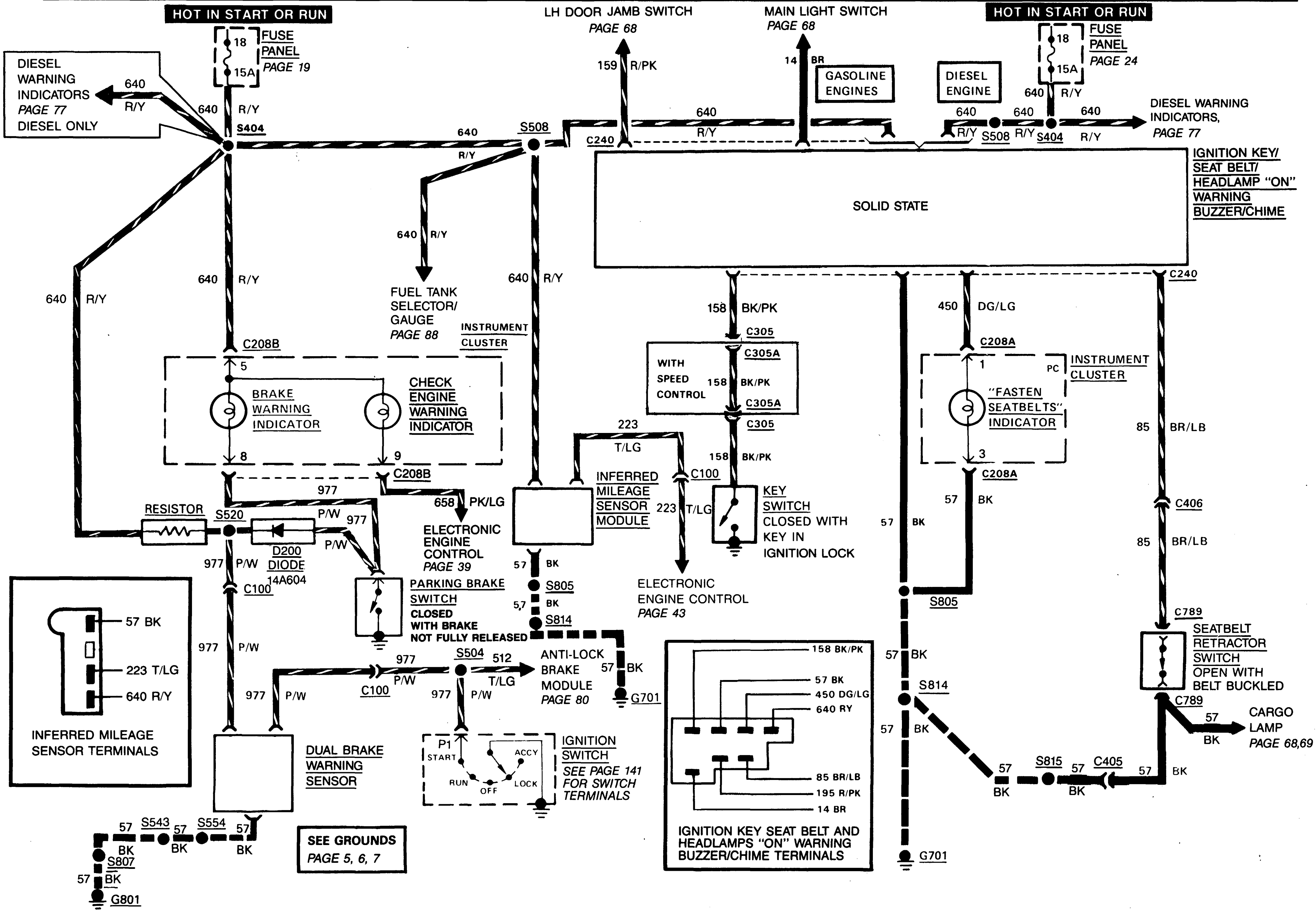
Refer to Component Testing Page 141 for additional testing details.

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• No Instrument Lamps light	• No voltage at T/W wire of Main Light Switch	• Check Fuse 4 and wiring
	• No voltage at LB/R wire of lamps	• Check Fuse 17, wiring and Main Light Switch
	• Defective Dimmer Switch of Main Light Switch	• Replace with known good Main Light Switch
	• No or poor continuity at circuit connections	• Clean/Tighten connections
• One Lamp does not light	• Blown bulb	• Replace bulb as required
	• Socket corrosion	• Clean/Replace socket

WARNING INDICATORS (BRAKE, IGNITION KEY, SEATBELT)



HOW THE CIRCUIT WORKS

Warning Indicators

The "**Engine**" **Warning Indicator** comes on with the **Ignition Switch** in RUN or START with low oil pressure and/or high coolant temperature.

The **Brake Warning Indicator** goes on:

1. With the **Ignition Switch** in START, to test the bulb. (This connection is closed just before the **Starter Relay** pulls in.)
2. When the brakes are applied and either front or rear brake system has failed (low pressure).
3. When the **Parking Brake Switch** closes.

With the **Ignition Switch** in START, the **Check Engine Warning Indicator** lights to test the bulb. With the **Ignition Switch** in RUN, the **Check Engine Warning Indicator** lights when a malfunction has occurred in the **EEC** system.

Seatbelt Warning

With the **Ignition Switch** in RUN, voltage is applied through **Fuse 18,** and the **"Fasten Belts" Indicator** for 4 to 8 seconds, whether belts are buckled or not. The buzzer/chime will sound during this time only if the driver's belt is not buckled.

Key Warning

Battery voltage is applied at all times through **Fuse 8** to the **LH Front Door Jamb Switch.** When the **LH Front Door** is opened, the **Door Jamb Switch** closes and battery voltage is applied through the **Warning Buzzer/Chime** to the **Key Switch.** Battery voltage is also applied at all times through **Fuse 4** to the **Main Light Switch.** When the **Main Light Switch** is turned to PARK or HEAD, voltage is applied through the Switch to the **Warning Buzzer/Chime.** Whenever the key is in the **Ignition,** the **Key Switch** is closed and provides a ground for the **Warning Buzzer/Chime.** Therefore, with the Lights ON and/or the **LH Front Door** open, the **Warning Buzzer/Chime** will sound if the key is in the Ignition.

Refer to section 33-01 of the shop manual.

COMPONENT LOCATION

Component	Location	Page-Figure
Brake Sensor	Part of master cylinder	—
Brake Warning Indicator	Part of instrument cluster	—
Check Engine Warning Indicator	Part of instrument panel	—
Ignition Switch	Attached to steering column	—
Refer to Component Testing Page 000 for additional testing details.		
Inferred Mileage Sensor Module	Attached to instrument to left of steering column	—
Key Switch	Part of ignition switch	—
Parking Brake Switch	On parking brake bracket	—
Seatbelt Switch	In driver's seatbelt buckle	—
Seatbelt Warning Buzzer/Chime	Attached in left center of I/P	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS — WARNING INDICATORS

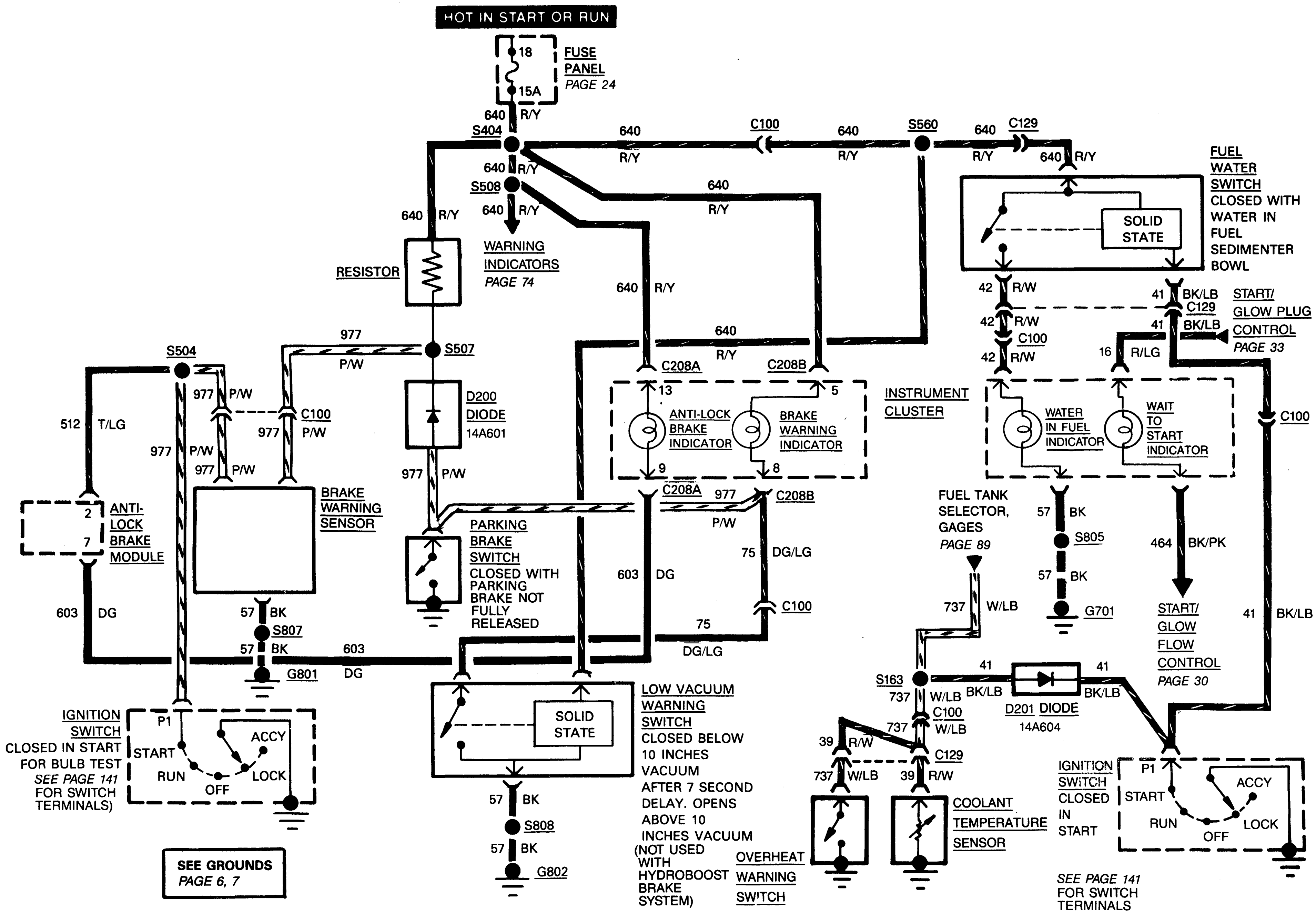
CONDITION	POSSIBLE CAUSE	ACTION
• Any Warning Indicator lights when systems are normal	• Defective switch	• Check switches providing ground path to indicator
	• Shorts to ground in wiring between Instrument Cluster and any switch	• Check resistance of wiring between cluster and chassis ground
• Warning Indicator doesn't light	• Blown bulb	• Replace bulb
	• No continuity from printed circuit to ground	• Check for any open wires or switches
	• No voltage at R/Y wire of C208B	• Check for open in wire or Fuse 18
	• Open in Instrument Cluster printed circuit	• Repair/Replace as required

TROUBLESHOOTING HINTS — SEATBELT WARNING

CONDITION	POSSIBLE CAUSE	ACTION
• No Seatbelt Warning Indicator Buzzer/Chime operation	• No voltage at R/Y buzzer/chime wire • No continuity to ground through BK wire	• Check Fuse 18 and wiring • Check for open in BK wire
• Seatbelt Indicator does not light	• Blown Bulb • No voltage at DG/LG wire of C208A when buzzer is on • No continuity from BK wire of C208A to G701 • Defective buzzer/chime	• Replace bulb • Check for open in wire • Check for open in BK wire • Replace with known good buzzer/chime
• Buzzer/Chime doesn't sound	• No continuity to ground from BR/LB wire of buzzer/chime • No voltage on R/Y wire at buzzer/chime • Defective buzzer/chime	• Check for open in BK wire • Check for open in R/Y wire or Fuse 18 • Replace with known good buzzer/chime

TROUBLESHOOTING HINTS — KEY WARNING

CONDITION	POSSIBLE CAUSE	ACTION
• Key Warning Buzzer/Chime does not sound	• No voltage at R/PK wire • No continuity to ground from BK/PK wire of buzzer/chime	• Check Fuse 8, R/PK buzzer wire and LH Door Jamb Switch for open • Apply ground to both ground pins of buzzer/chime. If buzzer/chime operates, repair opens in ground


HOT IN START OR RUN
18
15A
FUSE PANEL
PAGE 24
640 R/Y
S404
640 R/Y
C100
S560
C129
S508
WARNING INDICATORS
PAGE 74
RESISTOR
977 P/W
S507
S504
512 T/LG
C100
BRAKE WARNING SENSOR
D200 DIODE
14A601
ANTI-LOCK BRAKE MODULE
603 DG
57 BK
S807
G801
PARKING BRAKE SWITCH
CLOSED WITH PARKING BRAKE NOT FULLY RELEASED
C208A
C208B
ANTI-LOCK BRAKE INDICATOR
BRAKE WARNING INDICATOR
INSTRUMENT CLUSTER
75 DG/LG
IGNITION SWITCH
CLOSED IN START FOR BULB TEST
SEE PAGE 141 FOR SWITCH TERMINALS)
P1
START
RUN
OFF
ACCY
LOCK
SOLID STATE
LOW VACUUM WARNING SWITCH
CLOSED BELOW 10 INCHES VACUUM
AFTER 7 SECOND DELAY. OPENS ABOVE 10 INCHES VACUUM
(NOT USED WITH HYDROBOOST BRAKE SYSTEM)
S808
G802
SEE GROUNDS
PAGE 6, 7
FUEL WATER SWITCH
CLOSED WITH WATER IN FUEL SEDIMENTER BOWL
42 R/W
41 BK/LB
START/ GLOW PLUG CONTROL
PAGE 33
16 R/LG
WATER IN FUEL INDICATOR
WAIT TO START INDICATOR
FUEL TANK SELECTOR, GAGES
PAGE 89
57 BK
S805
G701
464 BK/PK
START/ GLOW FLOW CONTROL
PAGE 30
737 W/LB
S163
D201 DIODE
14A604
39 R/W
OVERHEAT WARNING SWITCH
COOLANT TEMPERATURE SENSOR
IGNITION SWITCH
CLOSED IN START
SEE PAGE 141 FOR SWITCH TERMINALS

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in START or RUN, the **Diesel Warning Indicators** are powered through **Fuse 18**. With the **Ignition Switch** in START, the indicators are grounded for a bulb test.

The **Brake Warning Indicator** goes on:

1. With the **Ignition Switch** in START, to test the bulb. (This connection is closed just before the **Starter Relay** pulls in.)
2. When the brakes are applied and either front or rear brake system has failed (low pressure).
3. When the **Parking Brake Switch** closes.
4. When the **Low Vacuum Warning Switch** closes.

The **Low Vacuum Warning Switch** (not used with Hydroboost brake system) closes when manifold vacuum falls below 10 inches. The **Parking Brake Switch** closes when the parking brake is engaged.

There is a 7-second delay after the **Low Vacuum Warning Switch** opens or closes to prevent nuisance flashing of the Brake Indicator. Note that a belt driven vacuum pump is used with the diesel engine to supply vacuum. When the engine has been off for several minutes or more and vacuum has bled down, the **Brake Indicator** will come on as soon as the **Ignition Switch** is turned to RUN. The indicator will stay on even after the engine is started until vacuum has reached a normal level.

CAUTION

Do not drive vehicle until the brake indicator goes out. Greatly increased pedal effort is required to stop without vacuum assistance for the brakes.

COMPONENT LOCATION

Component	Location	Page-Figure
Anti-lock Brake Module	Behind I/P left of center	—
Anti-lock Brake Indicator	Part of instrument cluster	—
Brake Warning Sensor	Part of master cylinder	—
Fuel Filter Indicator	Part of instrument cluster	—
Coolant Temperature Sensor	On LH front of engine	134-2,136-4
Diesel/Warning Lamp Module	Behind LH side of I/P near fuse panel	—
Fuel Water Switch	Part of fuel filter on upper RH front of engine	—
Low Vacuum Warning Switch (Not with Hydroboost Brake System)	On RH fender apron	—
Overheat Warning Switch	On LH side of engine	137-5
Parking Brake Switch	On parking brake bracket	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

The **Fuel Water Switch** senses water in the fuel/water separator sediment bowl. The switch will close with water in the sediment bowl and the **Water-In-Fuel Indicator** will go on. See Shop Manual section 25-50 for draining instructions.

Refer to section 33-01 of the shop manual.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Any Warning Indicator lights when systems are normal	• Defective switch	• Check switches providing ground path for indicator
	• Shorts to ground in wiring between warning bulb and switch	• Repair shorts in wiring as required
• Any Warning Indicator doesn't light	• Blown bulb	• Replace bulb
	• Poor ground connection from bulb	• Clean/Tighten connection or repair open in wiring
	• No voltage at R/Y, R/W or BK/PK wire at affected bulb with Ignition Switch in RUN	• Repair opens in wiring

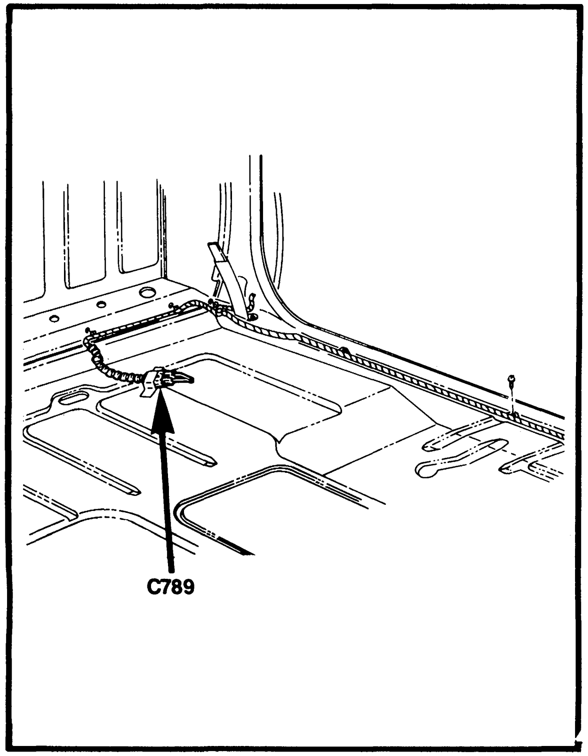


Figure 1 — Seat Belt Wiring (Standard Cab)

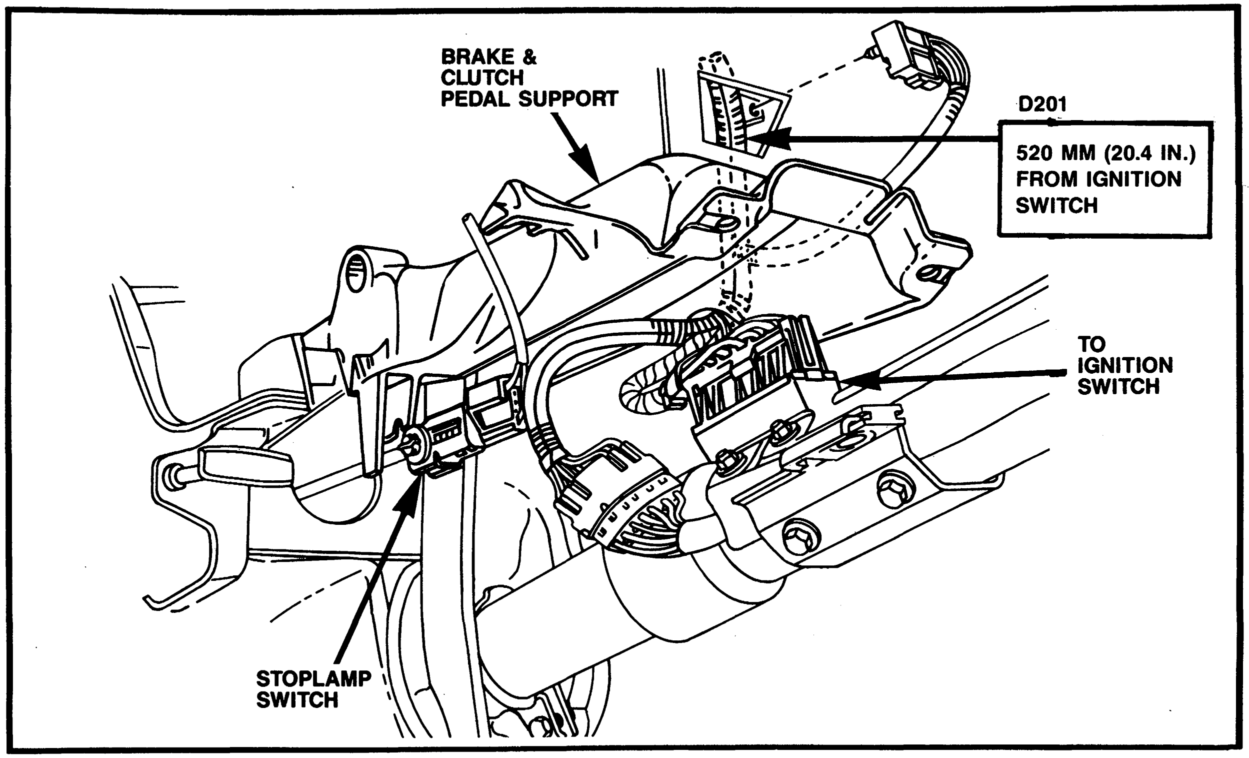
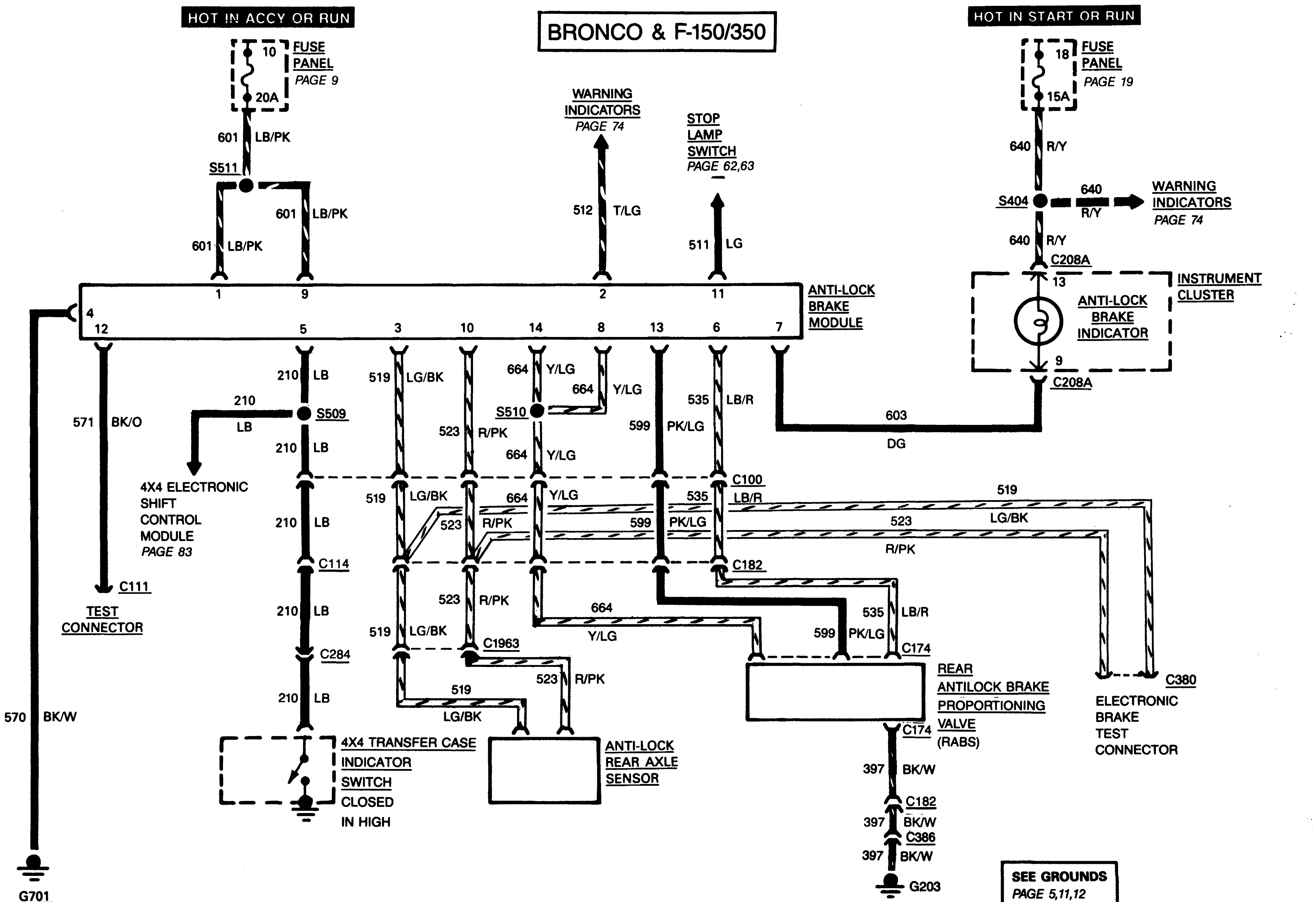


Figure 2 – Stop Lamp Switch


BRONCO & F-150/350
HOT IN ACCY OR RUN
10
20A
FUSE PANEL
PAGE 9
601 LB/PK
S511
601 LB/PK
601 LB/PK
WARNING INDICATORS
PAGE 74
512 T/LG
STOP LAMP SWITCH
PAGE 62,63
511 LG
HOT IN START OR RUN
18
15A
FUSE PANEL
PAGE 19
640 R/Y
S404
640 R/Y
WARNING INDICATORS
PAGE 74
640 R/Y
C208A
13
INSTRUMENT CLUSTER
ANTI-LOCK BRAKE INDICATOR
9
C208A
1 9 2 11
4 12 5 3 10 14 8 13 6 7
ANTI-LOCK BRAKE MODULE
571 BK/O
C111
TEST CONNECTOR
210 LB
210 LB
S509
4X4 ELECTRONIC SHIFT CONTROL MODULE
PAGE 83
210 LB
210 LB
C114
210 LB
C284
210 LB
4X4 TRANSFER CASE INDICATOR SWITCH
CLOSED IN HIGH
519 LG/BK
523 R/PK
664 Y/LG
664 Y/LG
S510
664 Y/LG
599 PK/LG
535 LB/R
603 DG
C100
519 LG/BK
664 Y/LG
535 LB/R
519
LG/BK
523 R/PK
599 PK/LG
523
R/PK
C182
523 R/PK
519 LG/BK
C1963
523 R/PK
519 LG/BK
664 Y/LG
535 LB/R
599 PK/LG
C174
ANTI-LOCK REAR AXLE SENSOR
REAR ANTILOCK BRAKE PROPORTIONING VALVE (RABS)
C174
C380
ELECTRONIC BRAKE TEST CONNECTOR
570 BK/W
G701
397 BK/W
C182
397 BK/W
C386
397 BK/W
G203
SEE GROUNDS
PAGE 5,11,12

HOW THE CIRCUIT WORKS

The Anti-lock Brake System is powered thru **Fuse 10** with the **Ignition Switch** in ACCY or RUN. The **Anti-lock Indicator** is powered thru **Fuse 18.**

The Anti-lock Brake Moduleprocesses signals from the **Anti-lock Rear Axle Sensor, Stop Lamp Switch** and *4x4 Transfer Case Indicator Switch* to energize the **Rear Anti-lock Brake Proportioning (RABS) Valve** to first isolate the **Rear Wheel Cylinders** from the **Master Cylinder.**If the signals indicate that rear wheel lock-up is still impending then the **RABS Valve** is energized with rapid pulses to bleed sufficient fluid from the isolated rear brake system to prevent lock-up.

Refer to section 12-01 of the shop manual.

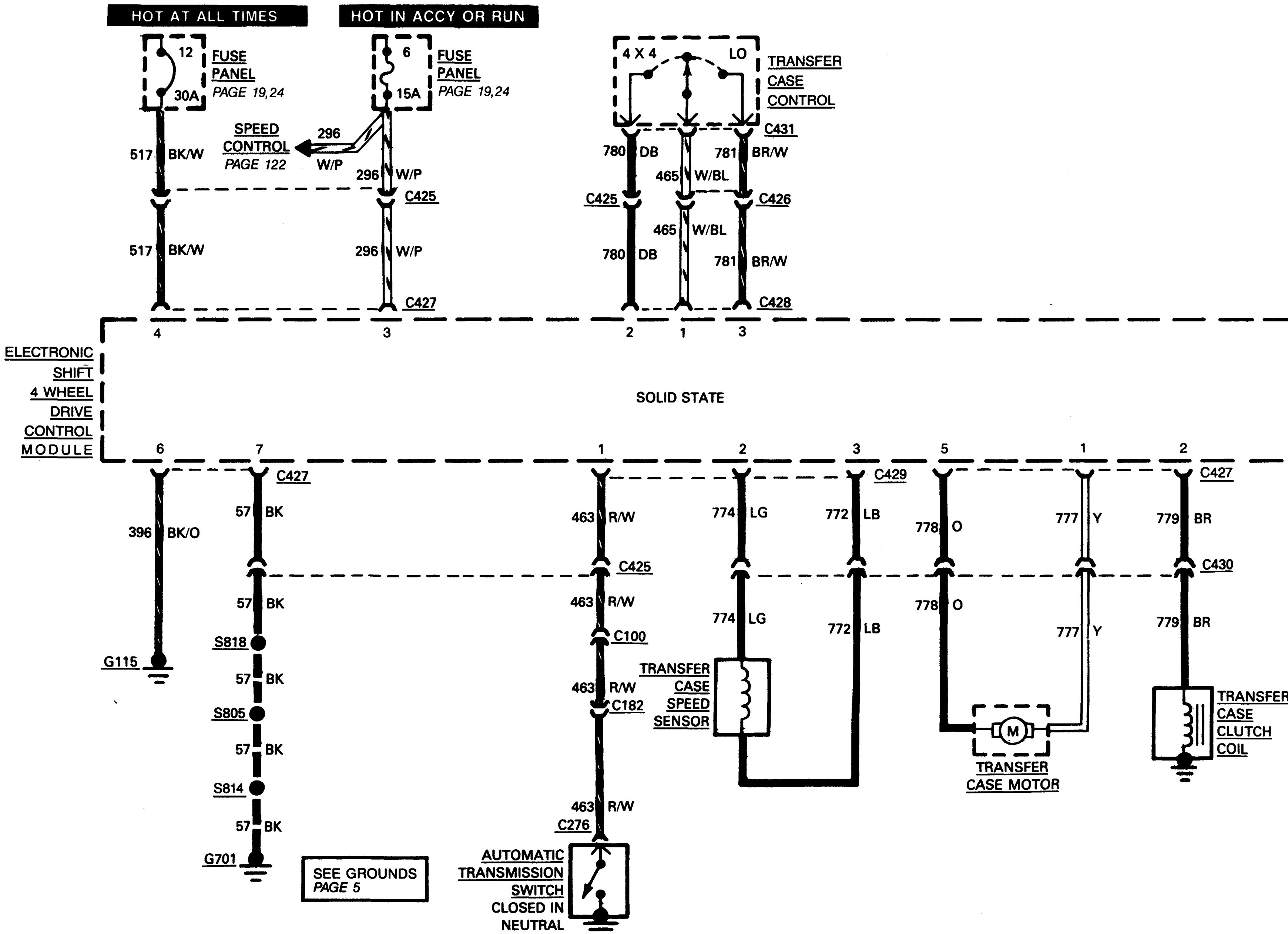
COMPONENT LOCATION

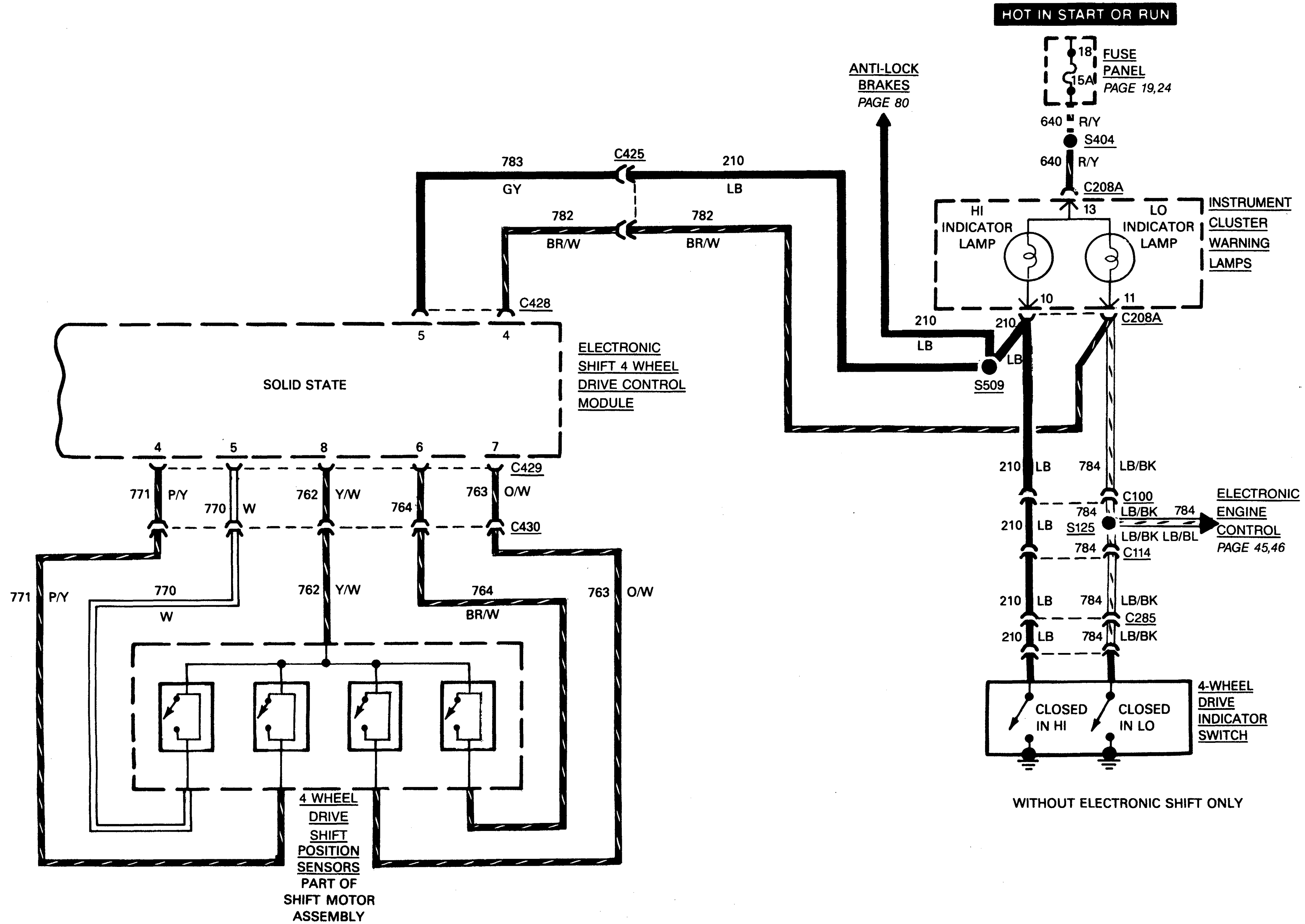
Component	Location	Page-Figure
Anti-lock Brake Indicator	Part of instrument cluster	—
Anti-lock Brake Module	Behind I/P left of center	—
Anti-lock Rear Axle Sensor	At rear axle	—
Rear Anti-lock Brake Proportioning Valve	Inside of LH frame rail behind # crossmember	—
4x4 Transfer Case Indicator Switch	On transfer case	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Anti-lock Indicator is lit.	• Defect in Anti-lock Brake System	• Ground test connector terminal C380 to obtain a diagnostic code from the Anti-lock Indicator. See Shop Manual Section 12-01 for more information.


HOT AT ALL TIMES
HOT IN ACCY OR RUN
12
30A
FUSE PANEL
PAGE 19,24
6
15A
FUSE PANEL
PAGE 19,24
SPEED CONTROL
PAGE 122
296
W/P
517 BK/W
296 W/P
C425
517 BK/W
296 W/P
C427
4 X 4
LO
TRANSFER CASE CONTROL
C431
780 DB
781 BR/W
465 W/BL
C425
C426
465 W/BL
780 DB
781 BR/W
C428
4
3
2
1
3
ELECTRONIC SHIFT 4 WHEEL DRIVE CONTROL MODULE
SOLID STATE
6
7
1
2
3
5
1
2
C427
C429
C427
396 BK/O
57 BK
463 R/W
774 LG
772 LB
778 O
777 Y
779 BR
C425
C430
57 BK
463 R/W
774 LG
772 LB
778 O
777 Y
779 BR
C100
S818
G115
57 BK
463 R/W
C182
TRANSFER CASE SPEED SENSOR
S805
57 BK
TRANSFER CASE MOTOR
TRANSFER CASE CLUTCH COIL
S814
57 BK
463 R/W
C276
G701
SEE GROUNDS
PAGE 5
AUTOMATIC TRANSMISSION SWITCH
CLOSED IN NEUTRAL



HOT IN START OR RUN
18
15A
FUSE PANEL
PAGE 19,24
640 R/Y
S404
640 R/Y
C208A
13
ANTI-LOCK BRAKES
PAGE 80
INSTRUMENT CLUSTER WARNING LAMPS
HI INDICATOR LAMP
LO INDICATOR LAMP
10
11
C208A
783
GY
C425
210
LB
782
BR/W
782
BR/W
C428
5
4
SOLID STATE
ELECTRONIC SHIFT 4 WHEEL DRIVE CONTROL MODULE
210
LB
210
LB
S509
4
5
8
6
7
C429
771 P/Y
770 W
762 Y/W
764
763 O/W
C430
210 LB
784 LB/BK
C100
784 LB/BK
784
S125
210 LB
LB/BK LB/BL
784
C114
ELECTRONIC ENGINE CONTROL
PAGE 45,46
210 LB
784 LB/BK
C285
210 LB
784 LB/BK
771 P/Y
770
W
762 Y/W
764
BR/W
763 O/W
CLOSED IN HI
CLOSED IN LO
4-WHEEL DRIVE INDICATOR SWITCH
WITHOUT ELECTRONIC SHIFT ONLY
4 WHEEL DRIVE SHIFT POSITION SENSORS
PART OF SHIFT MOTOR ASSEMBLY

HOW THE CIRCUIT WORKS

4-WHEEL DRIVE INDICATOR

With the **Ignition Switch** in ACCY or RUN and 4-wheel drive engaged, battery voltage is applied through **Fuse 18** to the **4-Wheel Drive Indicator** to light the appropriate indicator lamp.

Refer to section 33-01 of the shop manual.

ELECTRONIC SHIFT — 4-WHEEL DRIVE

When the **Shift Control Switch** is placed in 4x4 or Low, the **Electronic Shift Control Module** will analyze information from the **Shift Position Sensors** to determine their current positions. It will also analyze information inputs from the **Transfer Case Speed Sensor** and the **Automatic Transmission Switch.** The **Electronic Shift Control Module** will then activate the **Transfer Case Motor** to produce the desired shift, and the **4-Wheel Drive Indicator** will be illuminated.

Refer to section 16-01 of the shop manual.

COMPONENT LOCATION

Component	Location	Page-Figure
Automatic Transmission Switch	In automatic transmission	—
Electronic Shift Control Module	RH cowl panel	85
Shift Control Switch	On LH side of I/P	—
Hi Indicator Lamp	Part of instrument cluster	—
Lo Indicator Lamp	Part of instrument cluster	—
Shift Position Sensors	Inside transfer case	85
Transfer Case Clutch Coil	Inside transfer case	—
Transfer Case Motor	Inside transfer case	85
Transfer Case Speed Sensor	Inside transfer case	—
4 Wheel Drive Indicator Switch	On transfer case	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS — 4-WHEEL DRIVE INDICATOR

CONDITION	POSSIBLE CAUSE	ACTION
• Indicator does not light	• No voltage at R/Y wire of warning lamps	• Check Fuse 18 and wiring
	• Blown Bulb	• Replace bulb

TROUBLESHOOTING HINTS — 4-WHEEL DRIVE INDICATOR

CONDITION	POSSIBLE CAUSE	ACTION
• Electronic Shift does not operate	• No voltage at BK/W or W/P wires of Electronic Shift Module	• Check Circuit Breaker 12, Fuse 6 and wiring
	• Defective Shift Control Switch	• Replace switch as required
	• Defective Transfer Case Motor	• Replace as required
	• Frayed or damaged wires or loose connections	• Repair as required

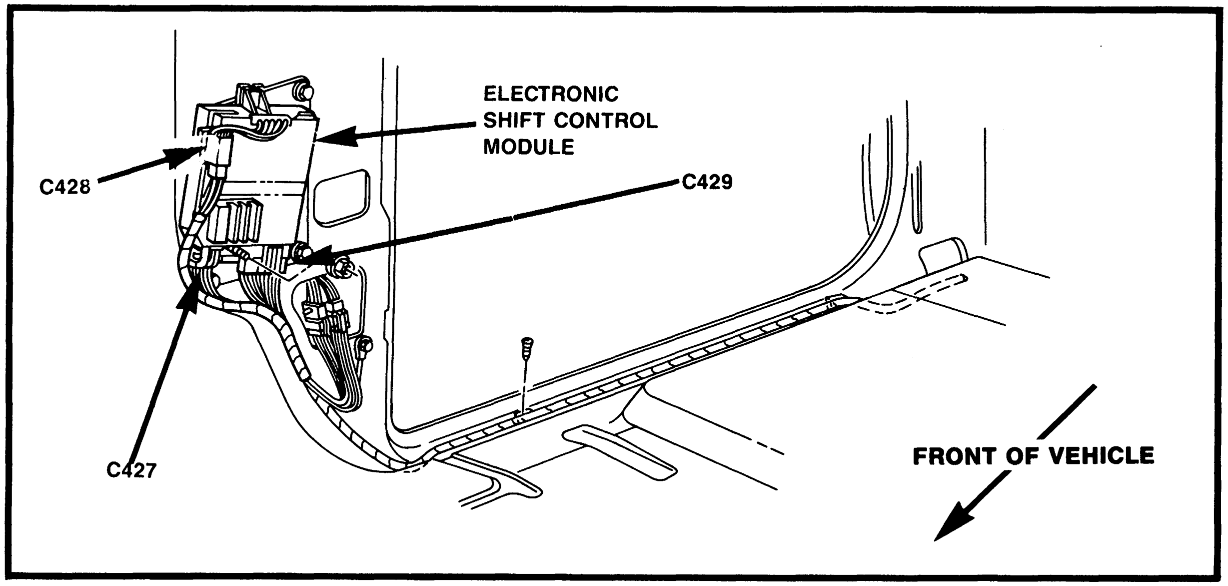


Figure 1 — Electronic Shift Control Module

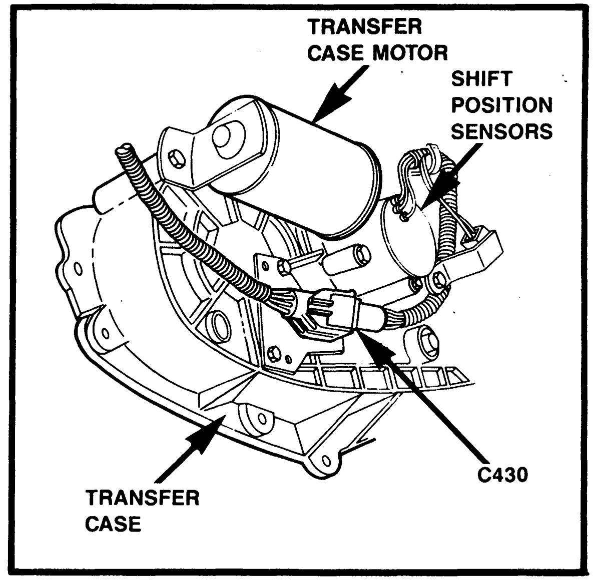
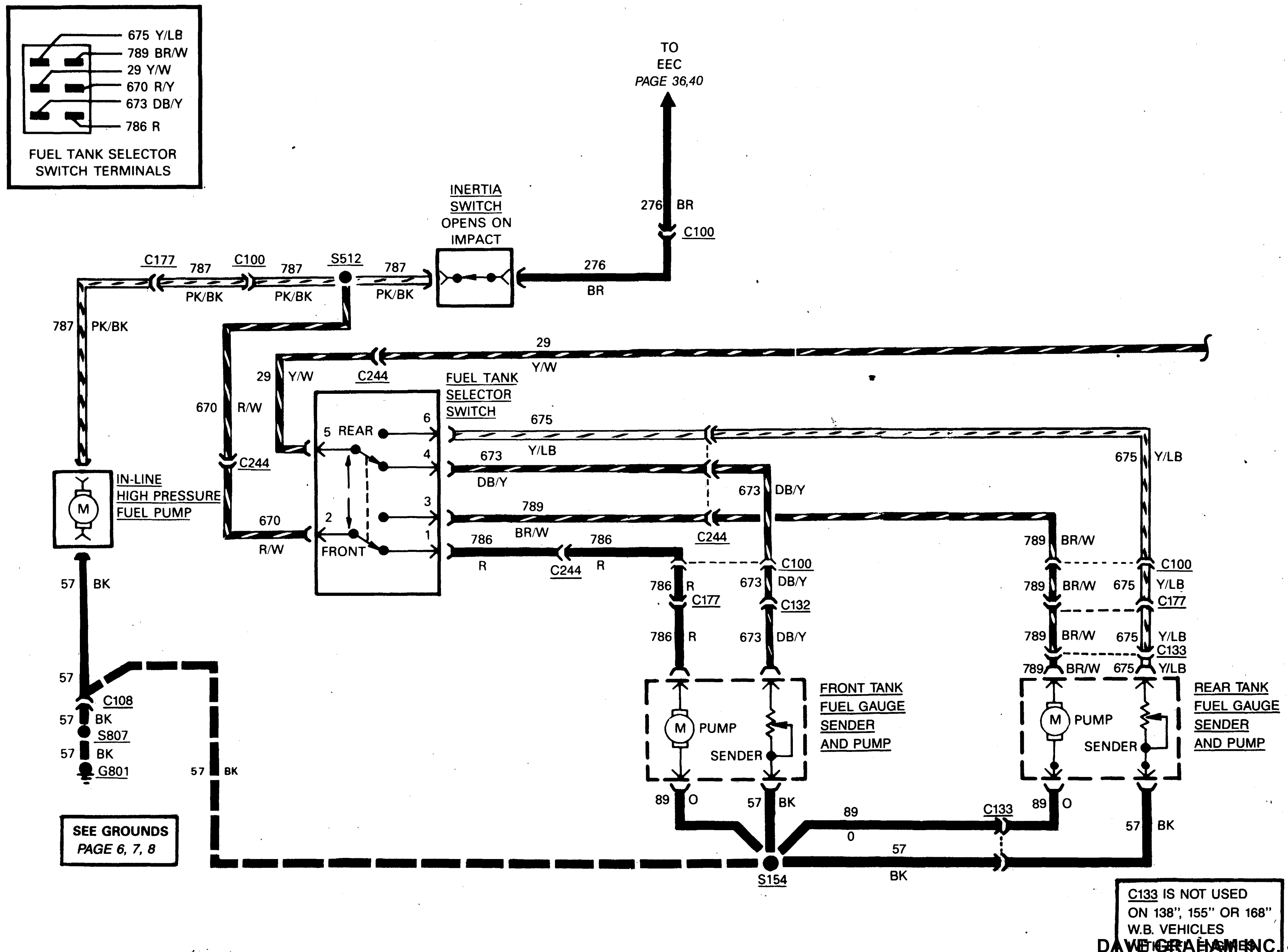
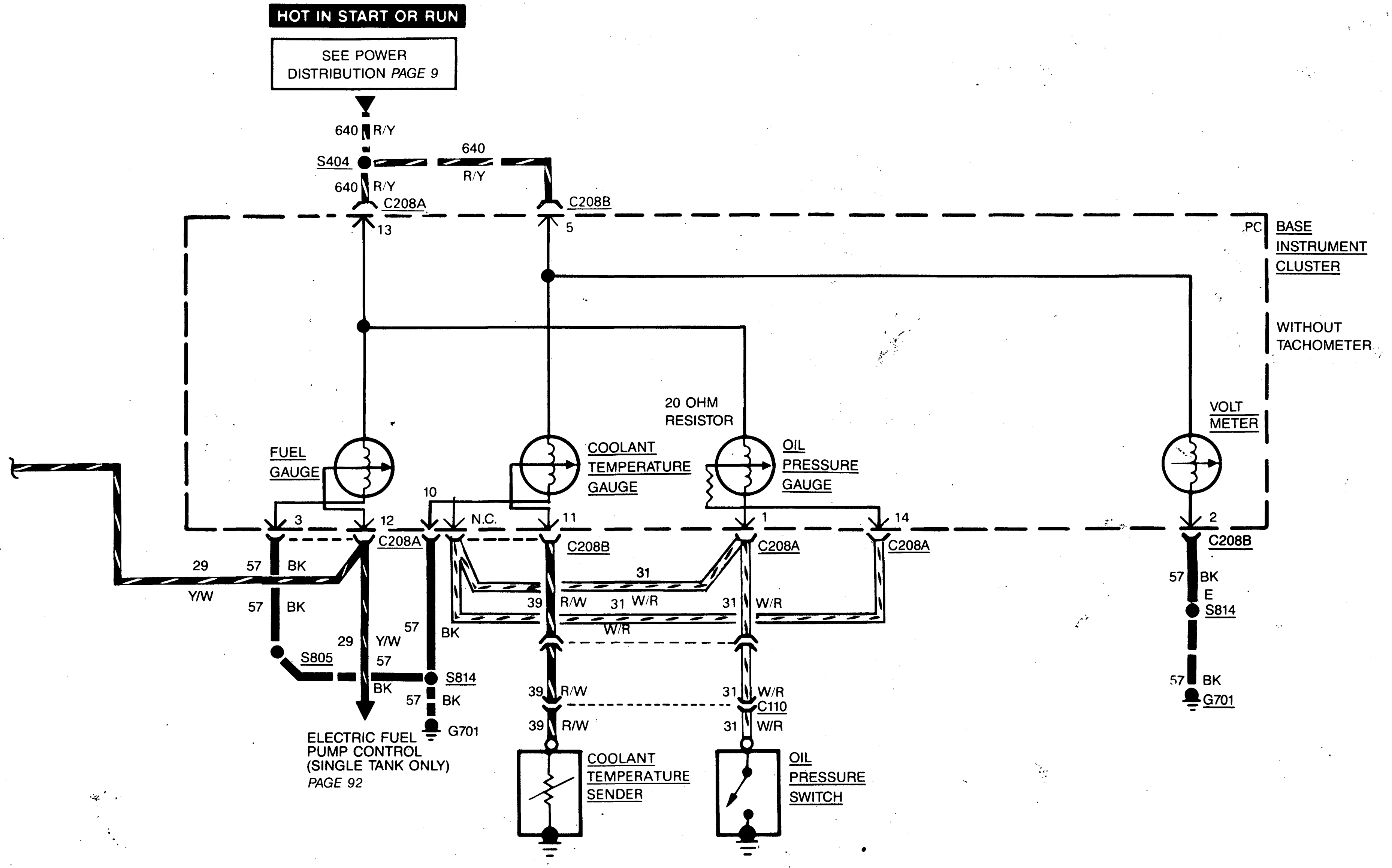


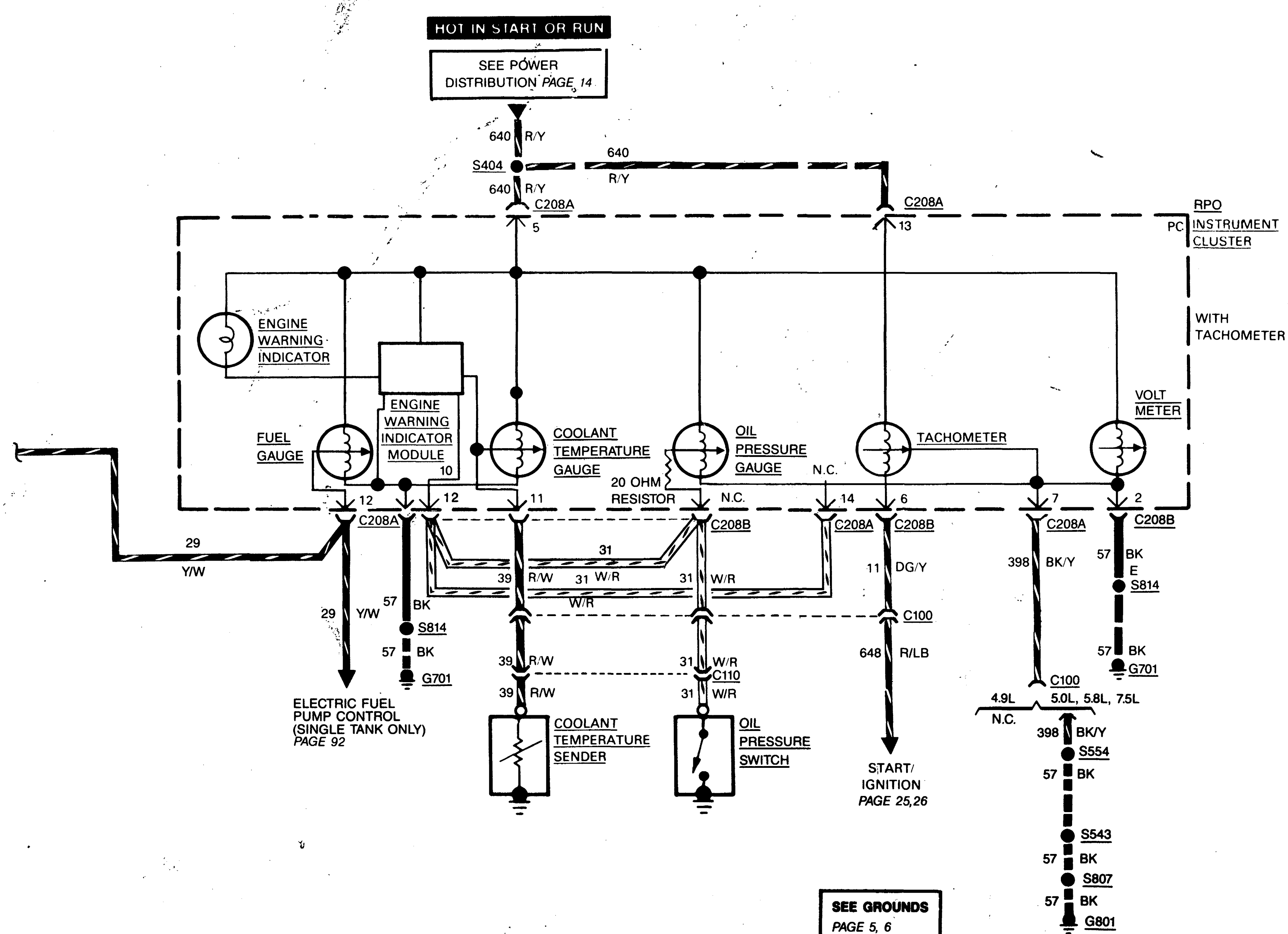
Figure 2 — At Transfer Case

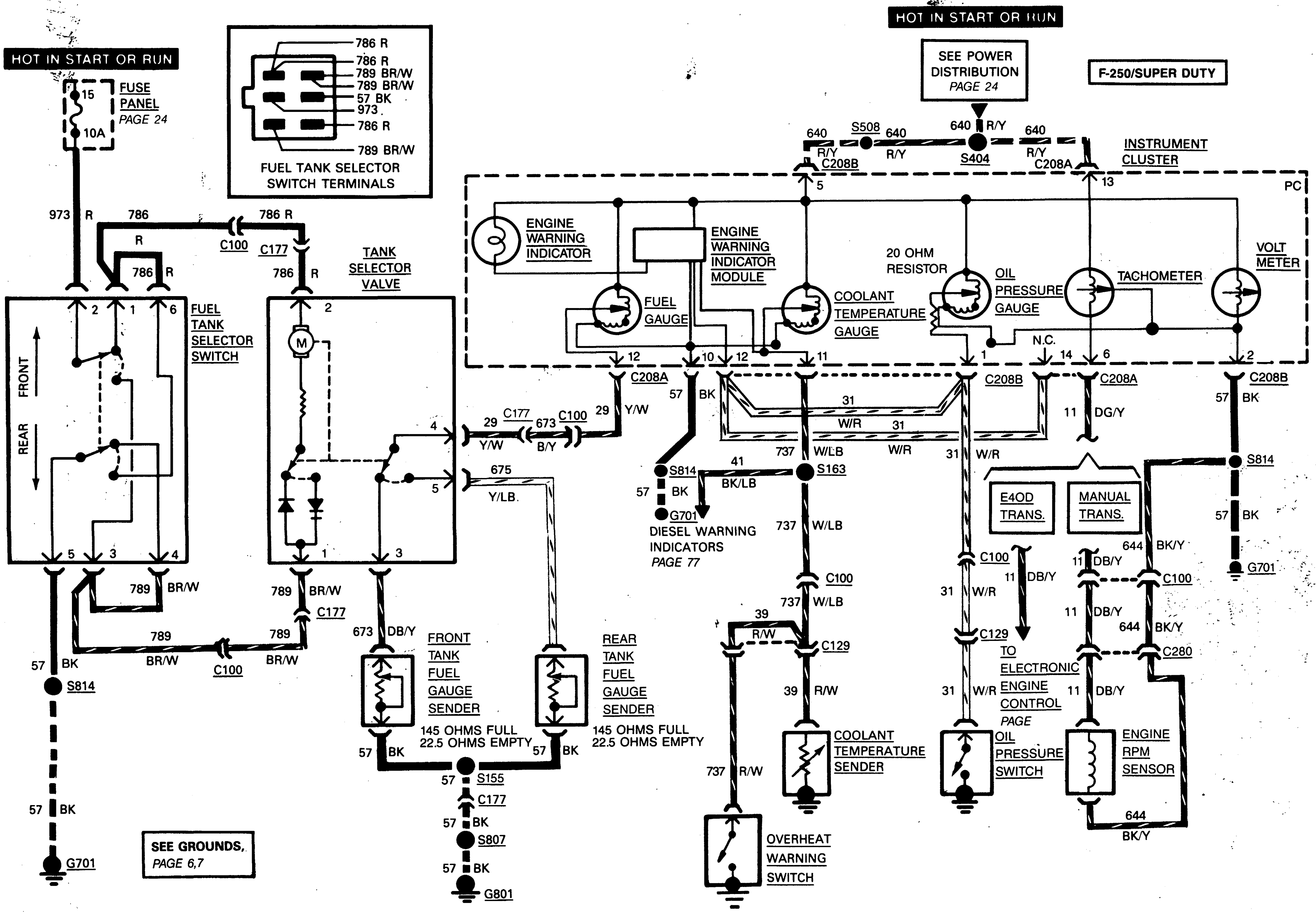


675 Y/LB
789 BR/W
29 Y/W
670 R/Y
673 DB/Y
786 R
FUEL TANK SELECTOR SWITCH TERMINALS
TO EEC PAGE 36,40
276 BR
C100
INERTIA SWITCH OPENS ON IMPACT
276 BR
C177
787 PK/BK
C100
787 PK/BK
S512
787 PK/BK
787 PK/BK
670 R/W
29 Y/W
C244
29 Y/W
FUEL TANK SELECTOR SWITCH
6
5 REAR
4
3
2
1
FRONT
675 Y/LB
673 DB/Y
789 BR/W
786 R
C244
786 R
C244
C244
670 R/W
IN-LINE HIGH PRESSURE FUEL PUMP
M
57 BK
57
C108
57 BK
S807
57 BK
G801
57 BK
SEE GROUNDS PAGE 6, 7, 8
673 DB/Y
C100
786 R
673 DB/Y
C177
C132
786 R
673 DB/Y
675 Y/LB
789 BR/W
C100
789 BR/W
675 Y/LB
C177
789 BR/W
675 Y/LB
C133
789 BR/W
675 Y/LB
FRONT TANK FUEL GAUGE SENDER AND PUMP
M PUMP
SENDER
REAR TANK FUEL GAUGE SENDER AND PUMP
M PUMP
SENDER
89 O
57 BK
89 0
C133
89 O
57 BK
57 BK
S154
C133 IS NOT USED ON 138", 155" OR 168" W.B. VEHICLES



SEE GROUNDS PAGE 5, 6


HOT IN START OR RUN
SEE POWER DISTRIBUTION PAGE 14
640 R/Y
S404
640 R/Y
640 R/Y
C208A
5
C208A
13
RPO INSTRUMENT CLUSTER
PC
WITH TACHOMETER
ENGINE WARNING INDICATOR
ENGINE WARNING INDICATOR MODULE
10
FUEL GAUGE
COOLANT TEMPERATURE GAUGE
20 OHM RESISTOR
OIL PRESSURE GAUGE
N.C.
TACHOMETER
VOLT METER
12
12
11
N.C.
14
6
7
2
C208A
C208B
C208A
C208B
C208A
C208B
29 Y/W
31
39 R/W
31 W/R
31 W/R
W/R
11 DG/Y
398 BK/Y
57 BK
E
S814
29 Y/W
57 BK
S814
57 BK
G701
C100
648 R/LB
57 BK
G701
39 R/W
31 W/R
C110
39 R/W
31 W/R
C100
4.9L N.C.
5.0L, 5.8L, 7.5L
398 BK/Y
S554
57 BK
S543
57 BK
S807
57 BK
G801
ELECTRIC FUEL PUMP CONTROL (SINGLE TANK ONLY) PAGE 92
COOLANT TEMPERATURE SENDER
OIL PRESSURE SWITCH
START/ IGNITION PAGE 25,26
SEE GROUNDS PAGE 5, 6


HOT IN START OR RUN
FUSE PANEL
PAGE 24
15
10A
786 R
786 R
789 BR/W
789 BR/W
57 BK
973
786 R
789 BR/W
FUEL TANK SELECTOR SWITCH TERMINALS
973 R
786
786 R
R
C100
C177
786 R
786 R
TANK SELECTOR VALVE
FUEL TANK SELECTOR SWITCH
FRONT
REAR
M
HOT IN START OR RUN
SEE POWER DISTRIBUTION
PAGE 24
F-250/SUPER DUTY
640 R/Y
S508
S404
C208B
C208A
INSTRUMENT CLUSTER
PC
ENGINE WARNING INDICATOR
ENGINE WARNING INDICATOR MODULE
20 OHM RESISTOR
FUEL GAUGE
COOLANT TEMPERATURE GAUGE
OIL PRESSURE GAUGE
TACHOMETER
VOLT METER
N.C.
29 Y/W
673 B/Y
675 Y/LB.
57 BK
S814
41 BK/LB
S163
G701
DIESEL WARNING INDICATORS
PAGE 77
737 W/LB
31 W/R
11 DG/Y
E4OD TRANS.
MANUAL TRANS.
644 BK/Y
11 DB/Y
C100
C129
C280
TO ELECTRONIC ENGINE CONTROL
PAGE
39 R/W
737 R/W
789 BR/W
C177
673 DB/Y
FRONT TANK FUEL GAUGE SENDER
REAR TANK FUEL GAUGE SENDER
145 OHMS FULL
22.5 OHMS EMPTY
S155
S807
G801
COOLANT TEMPERATURE SENDER
OIL PRESSURE SWITCH
ENGINE RPM SENSOR
OVERHEAT WARNING SWITCH
SEE GROUNDS,
PAGE 6,7

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, circuit 640 R/Y from **Fuse 18** powers the **Fuel, Coolant Temperature, Oil Pressure Gauges, Volt Meter** and, **Tachometer** if so equipped.

The **Fuel Gauge** is connected to a **Fuel Gauge Sender.** The **Sender** is a variable resistor connected to a float in the fuel tank. When the fuel is low, resistance is high; when fuel is high, resistance is low.

The **Electric Fuel Pump Control** for **Dual Tanks** consists of three electric fuel pumps. Two low pressure **(C68 In-Tank Fuel Pumps)** located in both the front and rear tanks, pump fuel into a reservoir. A high pressure **In-Line Fuel Pump** then takes the fuel from the **Reservoir** to the **Fuel Injectors.**

This system allows fuel to be drawn from either the **Front** or **Rear Fuel Tank Unit.** With the **Ignition Switch** in START or RUN, voltage is applied through **Fuse Link M** to the **Fuel Pump Relay.** When the **Fuel Pump Relay** receives a signal from the **EEC Module** and the **Inertia Switch** is closed, power is supplied to the **In-Line Fuel Pump,** and depending on which position the **Fuel Tank Selector Switch** is in (FRONT OR REAR), to either the **Front** or **Rear In-Tank Fuel Pump.**

The **Fuel Tank Selector Switch** controls which **Fuel Tank Unit** is used. When turned to the Front position, power flows through the Front contacts of the **Fuel Tank Selector Switch** to the fuel pump of the **Front Fuel Tanks.** The sender in the **Front Fuel Tank Unit** is connected simultaneously to the **Fuel Gauge.**

When the **Fuel Tank Selector Switch** is turned to REAR, the **Fuel Pump** in the **Rear Fuel Tank Unit** is connected simultaneously to the **Fuel Gauge.**

When the **Fuel Tank Selector Switch** for 7.3L with the optional **Fuel Gauge** is connected to **the Front Tank Gauge Sender.** When the switch is in the REAR position, the **Fuel Gauge** is connected to the **Rear Tank Fuel Gauge Sender.** Voltage is applied through **Fuse 15** and the switch to energize the motor-driven **Tank Selector Valve.** Fuel is then drawn from the rear tank.

The selector valves for the 7.3L engines are motor driven valves, used to switch the **Fuel Gauge** between front and rear sending units as well as to switch fuel sources. The **Selector Switch** switches the sending units and In-Tank **Fuel Pumps** for the 4.9L ,5.0L, 5.8L and 7.5L engines.

The **Oil Pressure Gauge** is connected to a 20 ohm resistor and **Oil Pressure Switch.** At low oil pressure, the switch opens causing the gauge to indicate low. At proper oil pressure, midscale normal oil pressure. The resistor is located on the instrument clusters printed circuit board.

The Coolant Temperature Gaugecpnnects to

COMPONENT LOCATION

Component	Location	Page-Figure
Coolant Temperature Gauge	Part of instrument cluster	—
Coolant Temperature Switch		
(4.9L)	Behind #6 exhaust manifold on engine block	131-1
(5.0L and 5.8L)	LH side of intake manifold	136-4
(7.3L Diesel)	LH front of engine	137-5
(7.5L)	LH side of intake manifold	—
Engine RPM Sensor		
(7.3L Diesel)	At injection pump timing gear cover	137-5,138-6
Engine Warning Indicator	Part of instrument cluster	—
Engine Warning Indicator Module	Part of instrument cluster	—
Front Tank Fuel Gauge Sender	On tank in front of rear axle	94-11,12
Fuel Tank Selector Switch	Center of I/P	—
Fuel Tank Selector Valve Solenoid	On LH side frame member behind cab	91-1
Inertia Switch	LH dash panel above brake pedal	—
Oil Pressure Gauge	Part of instrument cluster	—
Oil Pressure Sender		
(4.9L)	On engine block to rear of oil filter	131-1
(5.0L, 5.8L, 7.5L)	LH front of engine	135-3
(7.3L Diesel)	Rear of engine	—
Rear Tank Gauge Sender	On tank behind rear axle	94-10
Tachometer	Part of instrument cluster	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

the **Coolant Temperature Sender.** The sender is a temperature-sensitive variable resistor. When the coolant temperature is low, resistance is high; when coolant temperature is high, resistance is low.

Refer to section 24-01 of the shop manual.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Fuel Tank Selector Switch does not work	• No voltage at R, Y/W or R/W wires of switch • Defective switch	• Check Fuses 15 and 18 and wiring • Replace switch as required
• One Gauge does not work	• Poor ground connection to BK wire of sender • Broken or corroded terminals at sender • Open circuit in gauge or wiring	• Clean/Tighten connection or repair any open in wiring • Clean/Replace • Replace gauge or repair open in wiring
• Incorrect gauge readings	• Gauge out of calibration • Gauge erratic	• Check gauge to read full at 145 ohms, empty at 22.5 ohms. • Check sender resistance at 154 to 162 ohms at full stop and 9 to 18 ohms at empty stop.

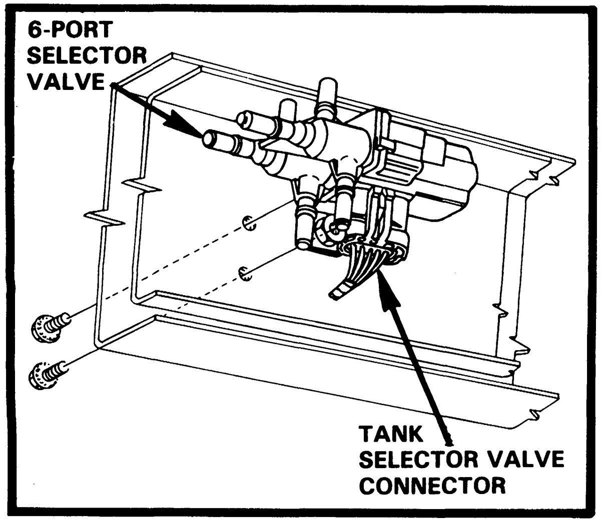
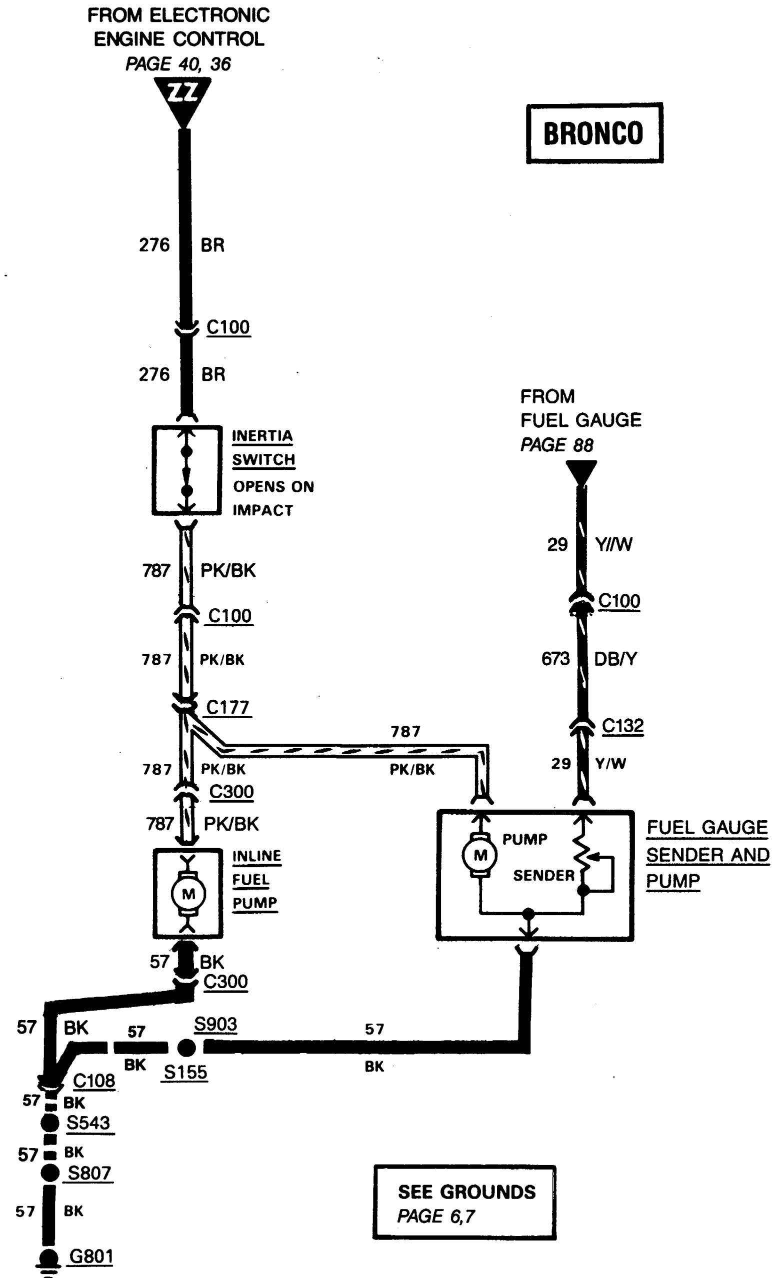
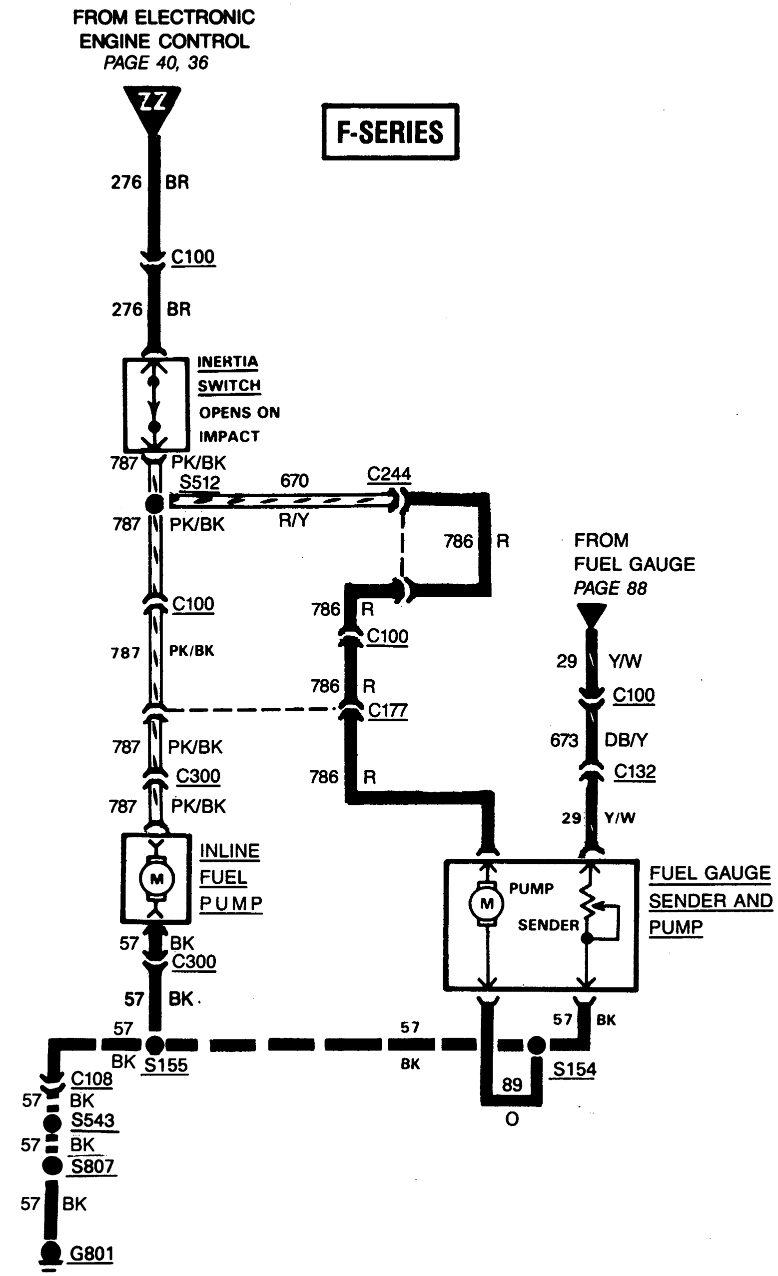


Figure 1 — 6 Port Fuel Tank Selector Valve, LH Side of Mainframe, Aft of Cab — 7.3L Diesel


FROM ELECTRONIC ENGINE CONTROL
PAGE 40, 36
ZZ
BRONCO
276 BR
C100
276 BR
INERTIA SWITCH
OPENS ON IMPACT
FROM FUEL GAUGE
PAGE 88
29 Y/W
787 PK/BK
C100
673 DB/Y
787 PK/BK
C177
787
C132
787 PK/BK
PK/BK
29 Y/W
C300
787 PK/BK
PUMP
SENDER
FUEL GAUGE SENDER AND PUMP
INLINE FUEL PUMP
57 BK
C300
57 BK
57
S903
57
BK
S155
BK
C108
57 BK
S543
57 BK
S807
57 BK
G801
SEE GROUNDS
PAGE 6,7


FROM ELECTRONIC ENGINE CONTROL
PAGE 40, 36
ZZ
F-SERIES
276 BR
C100
276 BR
INERTIA SWITCH
OPENS ON IMPACT
787 PK/BK
S512
670
C244
787 PK/BK
R/Y
786 R
FROM FUEL GAUGE
PAGE 88
C100
786 R
C100
787 PK/BK
29 Y/W
C100
786 R
C177
673 DB/Y
787 PK/BK
C300
786 R
C132
787 PK/BK
29 Y/W
INLINE FUEL PUMP
PUMP
SENDER
FUEL GAUGE SENDER AND PUMP
57 BK
C300
57 BK
57
57
57 BK
BK S155
BK
S154
89
O
C108
57 BK
S543
57 BK
S807
57 BK
G801

HOW THE CIRCUIT WORKS

The fuel delivery system consists of two electric fuel pumps. A low pressure **In-Tank Fuel Pump** which pumps fuel into a reservoir, and a high pressure In-Line Pump, which takes fuel from the **Reservoir** and pumps fuel to the **Fuel Injectors.**

With the **Ignition Switch** in START or RUN, Voltage is applied to **Fuel Pump Relay** through **Fuse Link M.** When the **Fuel Pump Relay** receives a signal from the **EEC Module** and with the **Inertia Switch** closed, power is applied to the **Fuel Pumps.**

When voltage is applied to the low pressure **Fuel Pump,** the **Reservoir** is filled with fuel. This **Reservoir** assures that adequate fuel flow is available to the high pressure **Fuel Pump** when climbing steep grades and during hard cornering, when the **In-Tank Fuel Pump** may be starved of fuel.

Refer to section 24-01 of the shop manual.

COMPONENT LOCATION

Component	Location	Page-Figure
Fuel/Gage Sender and Pump	At tank in front of rear axle	94-10, 11, 12
Inertia Switch	LH dash panel above brake pedal	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Fuel Pump doesn't work	• No voltage at PK/BK wire of Fuel Pump	• Check Fuse Link M and wiring
	• Poor ground connection to BK wire	• Clean/Tighten or repair open in wiring
	• Defective Fuel Pump Cutoff Relay	• Replace with known good relay
	• Open Inertia Switch	• Reset as required

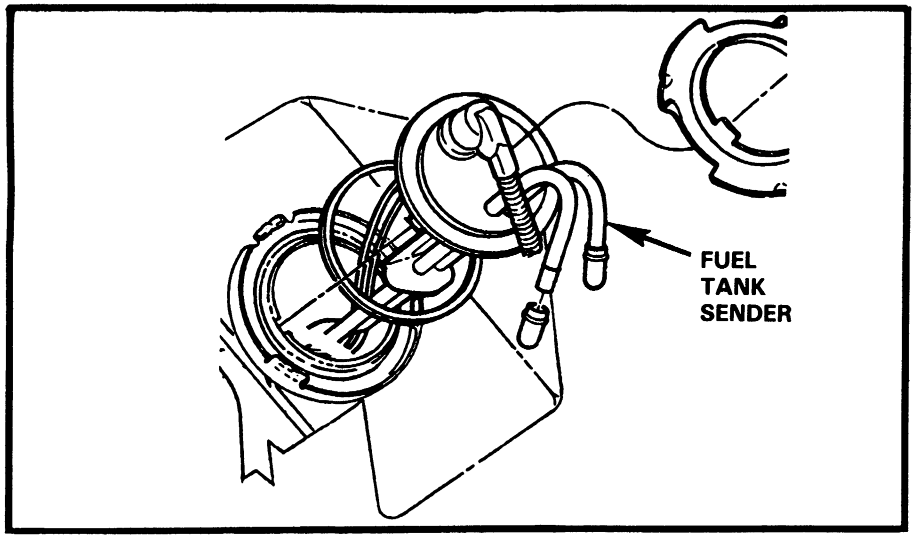


Figure 10 — Rear Tank (Behind Rear Axle)
(Bronco Only)

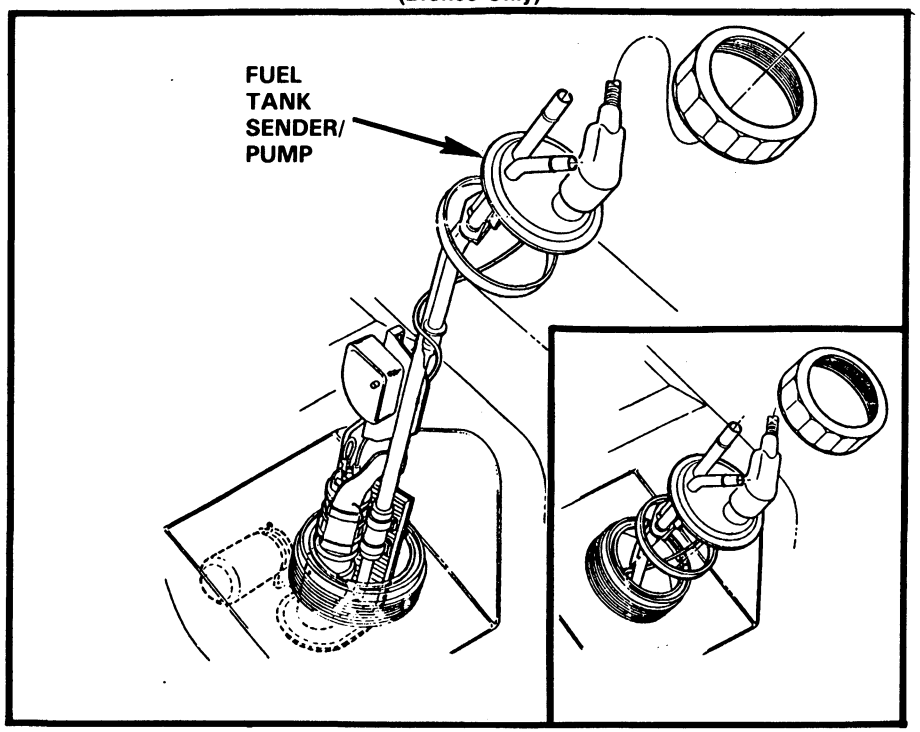


Figure 11 — Plastic Fuel Tank
(F-Series)

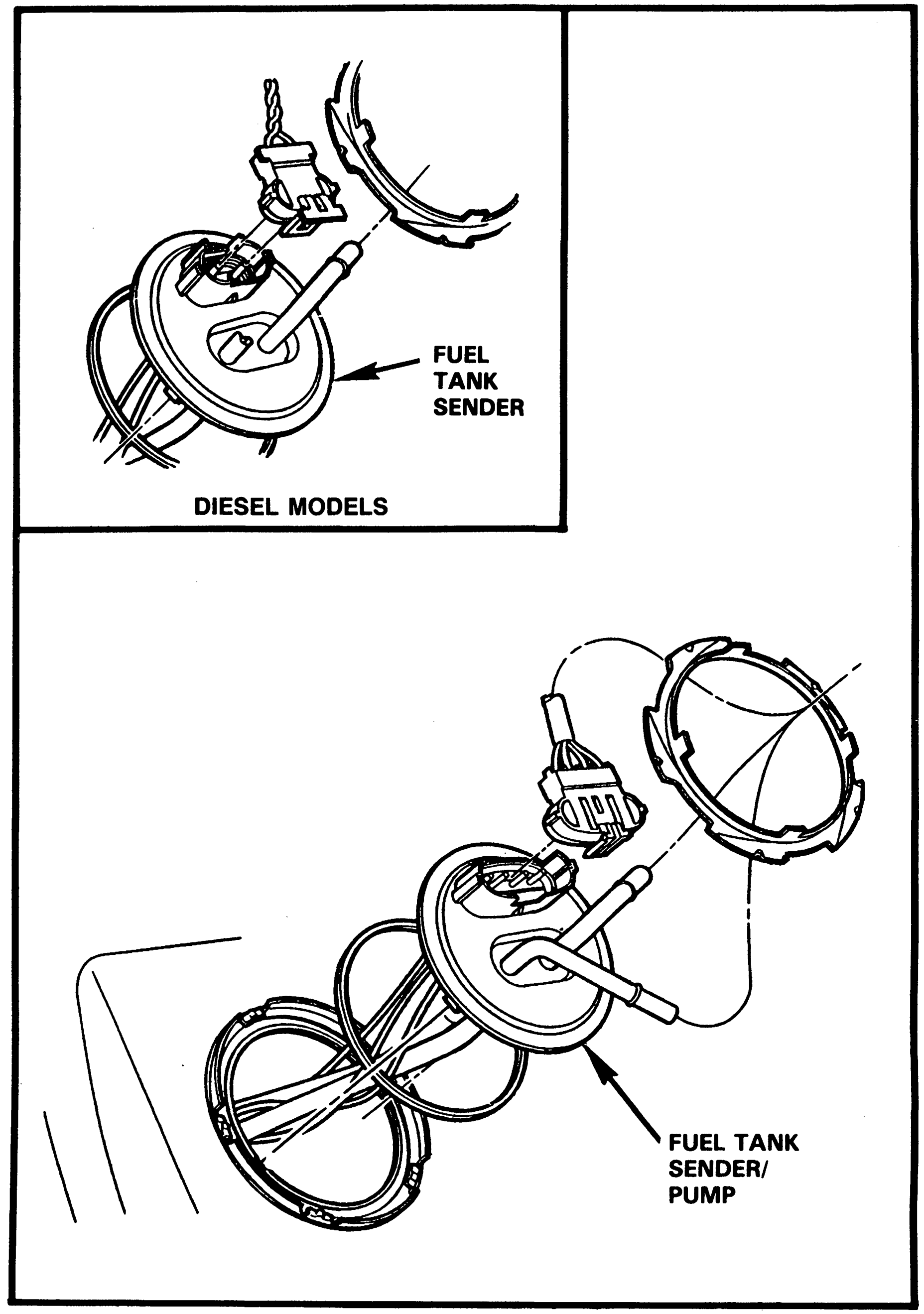
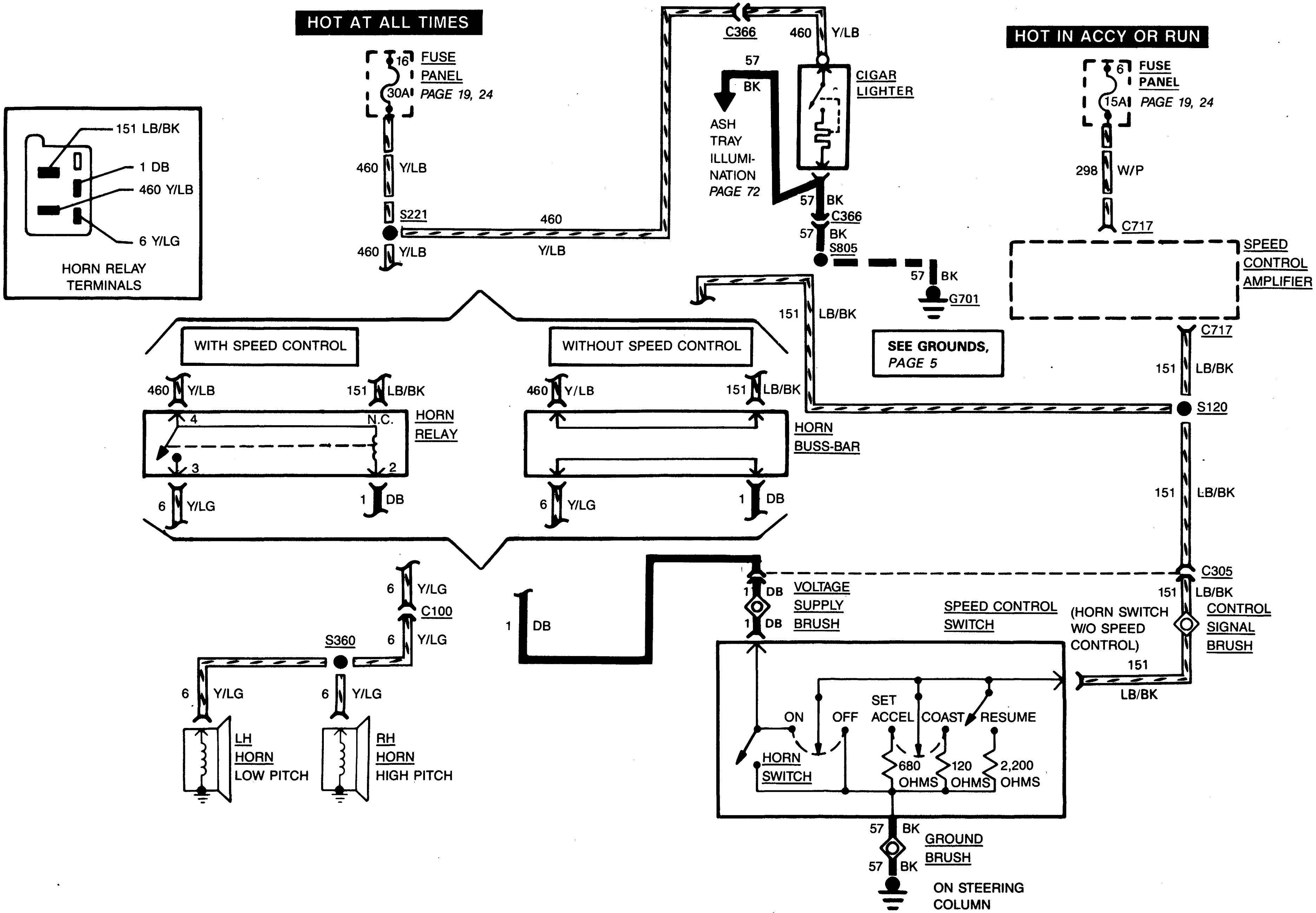


Figure 12 — Metal Fuel Tank
(F-Series)


HOT AT ALL TIMES
16 FUSE PANEL 30A PAGE 19, 24
460 Y/LB
S221
460 Y/LB
460
Y/LB
C366
460 Y/LB
57 BK
ASH TRAY ILLUMI-NATION PAGE 72
CIGAR LIGHTER
57 BK
C366
57 BK
S805
57 BK
G701
SEE GROUNDS, PAGE 5
HOT IN ACCY OR RUN
6 FUSE PANEL 15A PAGE 19, 24
298 W/P
C717
SPEED CONTROL AMPLIFIER
C717
151 LB/BK
S120
151 LB/BK
151 LB/BK
151 LB/BK
151 LB/BK
1 DB
460 Y/LB
6 Y/LG
HORN RELAY TERMINALS
WITH SPEED CONTROL
WITHOUT SPEED CONTROL
460 Y/LB
151 LB/BK
4
N.C.
HORN RELAY
3
2
6 Y/LG
1 DB
460 Y/LB
151 LB/BK
HORN BUSS-BAR
6 Y/LG
1 DB
6 Y/LG
C100
6 Y/LG
S360
6 Y/LG
6 Y/LG
LH HORN LOW PITCH
RH HORN HIGH PITCH
1 DB
1 DB
VOLTAGE SUPPLY BRUSH
1 DB
C305
151 LB/BK
SPEED CONTROL SWITCH
(HORN SWITCH W/O SPEED CONTROL)
CONTROL SIGNAL BRUSH
151
LB/BK
ON
OFF
SET ACCEL
COAST
RESUME
HORN SWITCH
680 OHMS
120 OHMS
2,200 OHMS
57 BK
GROUND BRUSH
57 BK
ON STEERING COLUMN

HOW THE CIRCUIT WORKS

HORNS

When the vehicle is equipped with speed control, battery voltage is applied at all times to the coil of the **Horn Relay** through **Fuse 6** and the **Speed Control Amplifier.** When the **Horn Switch** is closed, a ground is supplied through the steering column and the **Horn Relay** is pulled closed. Battery voltage is now applied through **Fuse 16** and the closed contacts of the **Horn Relay** to the case grounded **Horns.** If the vehicle is not equipped with speed control, battery voltage is applied at all times through **Fuse 16.** When the **Horn Switch** is closed, a ground is supplied through the case grounded **Horns** and the **Horns** sound.

Refer to section 35-01 of the shop manual.

COMPONENT LOCATION

		Page-Figure
Cigar Lighter	Center of I/P	—
Horns	LH front of radiator support	97-1
Horn Relay/Buss-Bar	Near speed control amplifier	—
Horn Switch	In steering wheel hub assembly	—
Speed Control Amplifier	Behind I/P at RH side of steering column	—
Speed Control Switch	Mounted in steering wheel hub assembly	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode, and splice descriptions and locations.

CIGAR LIGHTER

Voltage is applied at all times to the **Cigar Lighter**. Pushing in the **Cigar Lighter** closes the switch and allows current to flow through the heating element. The element opens the switch when it is heated.

Refer to section 35-01 of the shop manual.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Horn does not sound	• No voltage at Y/LB wire of Horn Relay or Horn Buss-Bar	• Check Fuse 16 and wiring
	• No voltage LB/BK wire of Horn Relay	• Check Fuse 6 and wiring
	• Defective Horn Relay	• Replace with known good Relay
	• No continuity through Horn Buss-Bar	• Check continuity through buss-bar and replace if necessary
	• Defective Horn Switch	• Check continuity through switch and replace if necessary
	• Poor ground connection at steering column	• Repair connection
	• Horn out of adjustment	• Turn adjusting screw on Horn counterclockwise 1/4 to 3/8 turn and secure
	• Defective Horn	• Replace with known good Horn

TROUBLESHOOTING HINTS — CIGAR LIGHTER

CONDITION	POSSIBLE CAUSE	ACTION
• Cigar Lighter doesn't work	• No voltage at Y/LB wire of Cigar Lighter	• Check Fuse 16 and wiring
	• Poor continuity to ground at lighter shell	• Clean/Tighten connection and check BK wire for opens

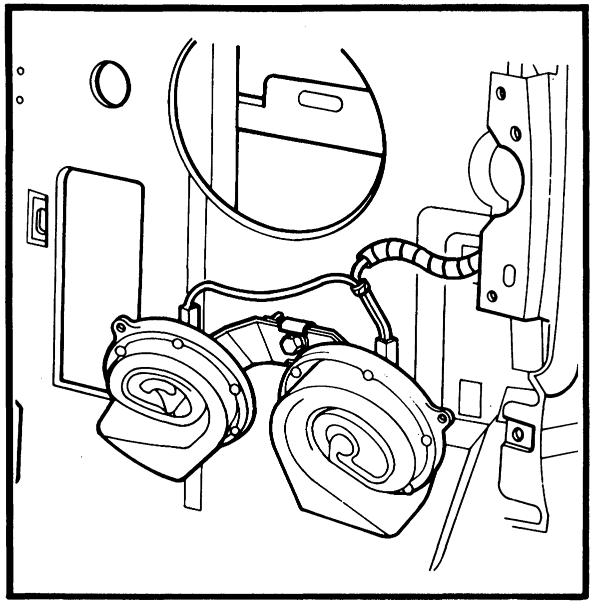


Figure 1 - Forward of Radiator Support, Single Bracket Mounting Dual Horns

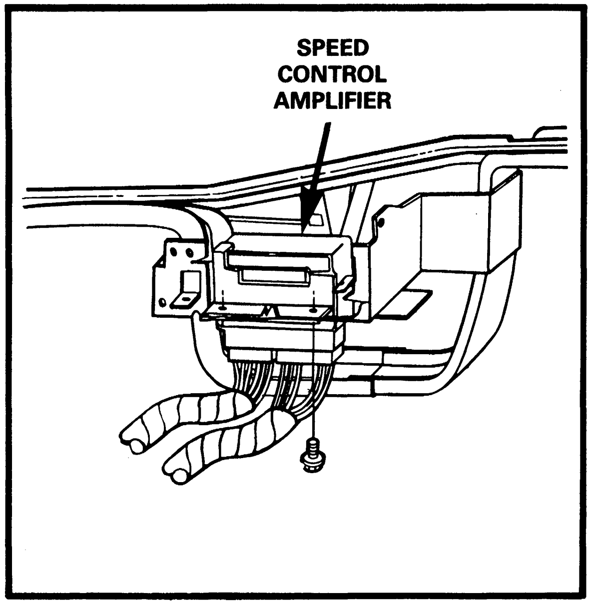
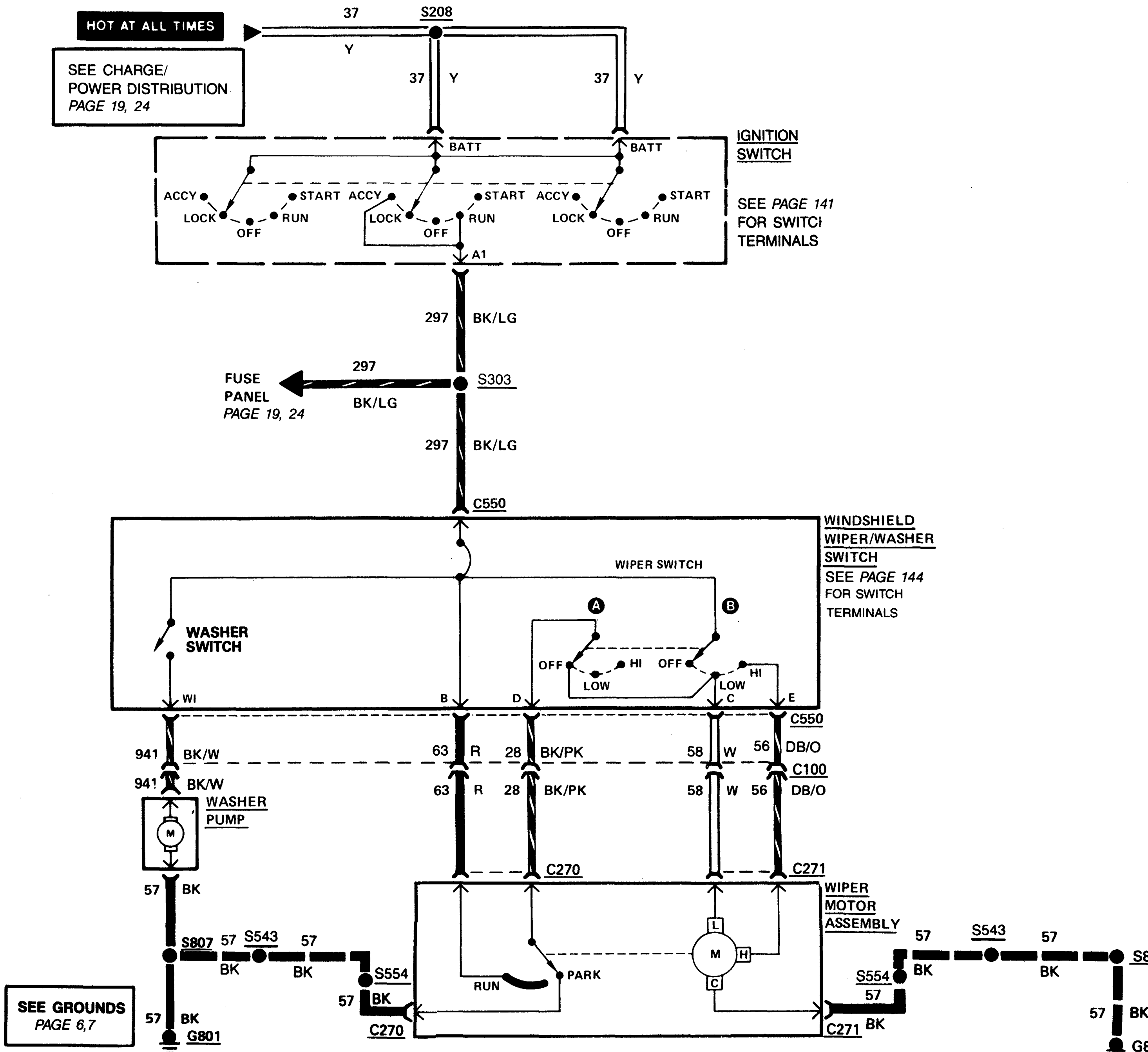


Figure 2 - Behind LH Side of I/P



HOT AT ALL TIMES
SEE CHARGE/ POWER DISTRIBUTION PAGE 19, 24
37
S208
Y
37 Y
37 Y
BATT
BATT
IGNITION SWITCH
ACCY
LOCK
OFF
RUN
START
SEE PAGE 141 FOR SWITCH TERMINALS
A1
297 BK/LG
FUSE PANEL PAGE 19, 24
297
BK/LG
S303
297 BK/LG
C550
WINDSHIELD WIPER/WASHER SWITCH
SEE PAGE 144 FOR SWITCH TERMINALS
WIPER SWITCH
WASHER SWITCH
A
B
OFF
LOW
HI
WI
B
D
C
E
C550
941 BK/W
63 R
28 BK/PK
58 W
56 DB/O
C100
941 BK/W
WASHER PUMP
M
C270
C271
WIPER MOTOR ASSEMBLY
PARK
RUN
L
H
C
57 BK
S807
57
S543
57
BK
BK
S554
57 BK
C270
SEE GROUNDS PAGE 6,7
G801
C271 BK

HOW THE CIRCUIT WORKS

The **Windshield Wiper/Washer Switch** has both a momentary washer switch and wiper switch. The wiper switch has three positions: OFF, and LO and HI speeds.

Washer Operation—Current flows directly to the **Washer Pump** motor as long as the washer switch is depressed.

Wiper Operation—The wipers are controlled by the three-position wiper switch and the wiper motor switch. When the wipers are turned OFF, they continue to operate until they return to the PARK position of the wiper motor switch.

In LO or HI current flows through the wiper switch, into the L or H terminal of the **Wiper Motor,** and grounds through the C terminal.

When parking current flows through:

1. the **R** wire to the RUN contact of the wiper motor switch;
2. through the wiper motor switch and the **BK/PK** wire to the wiper switch;
3. through section Ⓐ of the wiper switch and the **W** wire to the **Wiper Motor** L terminal;
4. through **Wiper Motor** C terminal to ground.
5. When the **Wiper Motor** reaches the end of its travel, the wiper motor switch moves to PARK position. In this position, power is removed from the motor, and operation stops.

COMPONENT LOCATION

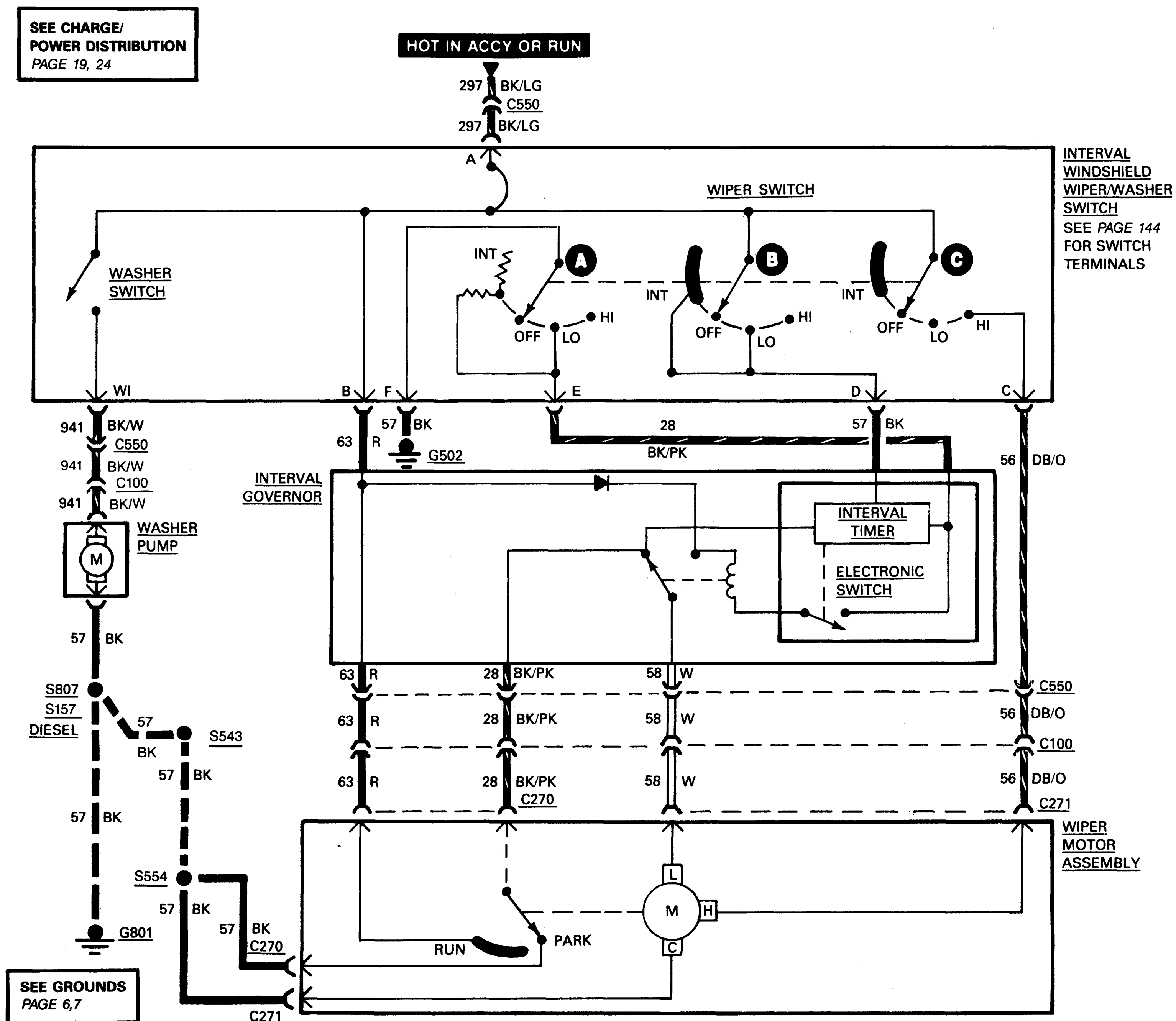
Component	Location	Page-Figure
Ignition Switch	Attached to steering column	—
Refer to Component Testing	Page 145 for additional testing details.	
Washer Pump	In washer reservoir	—
Windshield Wiper/Washer Switch	On LH side of I/P	102-2
Refer to Component Testing	Page 144 for additional testing details.	
Wiper Motor Assembly	Attached to center of dash panel	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode, and splice descriptions and locations.

Refer to section 35-01 of the shop manual.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Washer Pump doesn't work	• Circuit Breaker In Wiper/Washer Switch is open	• Reset and check for shorts to ground in BK wire
	• Damaged hoses	• Repair/Replace as required
	• Defective Pump Motor	• Replace with known good motor
• Wipers don't work	• Circuit Breaker in Wiper/Washer Switch is open	• Reset and check for shorts to ground in BK wire
	• Defective Wiper Motor	• Replace with known good motor
	• Frayed or damaged wires or loose connections	• Repair/Replace as required.


SEE CHARGE/ POWER DISTRIBUTION PAGE 19, 24
HOT IN ACCY OR RUN
297 BK/LG
C550
297 BK/LG
A
INTERVAL WINDSHIELD WIPER/WASHER SWITCH
SEE PAGE 144 FOR SWITCH TERMINALS
WIPER SWITCH
WASHER SWITCH
INT
A
B
C
INT
INT
OFF
LO
HI
OFF
LO
HI
OFF
LO
HI
WI
B
F
E
D
C
941 BK/W
C550
941 BK/W
C100
941 BK/W
WASHER PUMP
M
63 R
57 BK
G502
28 BK/PK
57 BK
56 DB/O
INTERVAL GOVERNOR
INTERVAL TIMER
ELECTRONIC SWITCH
57 BK
S807
S157
DIESEL
57 BK
S543
57 BK
57 BK
G801
S554
57 BK
57 BK
C270
C271
63 R
28 BK/PK
58 W
C550
63 R
28 BK/PK
58 W
56 DB/O
C100
63 R
28 BK/PK
C270
58 W
56 DB/O
C271
WIPER MOTOR ASSEMBLY
L
M
H
C
RUN
PARK
SEE GROUNDS PAGE 6,7

HOW THE CIRCUIT WORKS

The **Interval Windshield Wiper/Washer** allows the driver to select LO speed, HI speed, or INTerval wipe. In INTerval, the wipes can be spaced one second to fifteen seconds apart.

The **Interval Windshield Wiper/Washer Switch** has a momentary washer switch, a four-position wiper switch, and a variable resistor which sets interval time.

Washer Operation

As long as the washer switch is pressed, current flows directly to the **Washer Pump** motor.

Wiper Operation

When the wiper switch is in the LO position, section Ⓐ of the wiper switch powers the interval timer input so that the electronic switch is pulled closed. Current then flows through the wiper/washer switch, wire **63R,** the diode, the governor relay coil, wire **58W,** and section Ⓑ of the wiper/washer switch to **G502.** The governor relay coil pulls in the governor switch allowing current to flow through the motor.

When the wiper switch is in the **HI** position, section Ⓒ of the wiper/washer switch powers the motor through the H terminal.

When the wiper switch is placed in the OFF position, the circuit energizing the **Interval Governor** relay coil is broken. Current to the motor then flows through circuit **63,** the RUN contact of the wiper motor switch, and the de-energized **Interval Governor** relay contacts to the L terminal of the motor. After the completion of one wipe, the wiper motor switch returns to the PARK position. This removes power and the wiper motor stops.

COMPONENT LOCATION

		Page-Figure
Interval Governor	Lower reinforcement of I/P to left side of cowl	102-1
Interval Windshield Wiper/ Washer Switch	On LH side of I/P	102-2
Refer to Component Testing Page 144 for additional testing details.		
Washer Pump	In washer reservoir	—
Wiper Motor Assembly ...	Attached to center of dash panel	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode, and splice descriptions and locations.

Interval Wiper Operation

During interval operation, the wipers make single wipes at low speed separated by a variable length pause.

When first switched to INT position, section Ⓐ of the wiper switch activates the interval timer. The interval timer momentarily closes the electronic switch, energizing the governor relay. Current flows to the wiper motor L terminal through the energized contacts of the governor relay. Ground is connected to terminal C of the wiper motor.

As the wiper motor turns, the wiper motor switch changes from the grounded PARK position to the hot RUN position. Current now flows through the **R** wire, the RUN contact of the wiper motor switch and resets the interval timer, which opens the electronic switch. The current path continues through the de-energized governor relay contact to the L terminal of the wiper motor. Wiping continues to the completion of one wipe. The wiper motor switch returns to the PARK position contact, power is removed and the wiper motor stops. After a pause (controlled by a variable resistor) the interval timer pulls in the governor relay to start another wipe.

When parking is complete, the wiper motor is braked to a stop by grounding the L and C terminals through the wiper motor switch. Braking takes place when the wiper motor switch moves to the PARK position. The wiper motor L terminal is grounded through the PARK contact of the wiper motor switch and the de-energized contact of the governor relay.

Refer to section 35-01 of the shop manual.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• No Wipers in interval position	• Variable resistor of Wiper Switch is defective	• Repair/Replace as required
	• Defective Interval Governor	• Replace as required with known good governor
• Interval time is too long	• Defective Interval Governor	• Replace as required with known good governor
• Wipers operate in HI speed only	• Poor ground connection on BK wire from Wiper Switch	• Clean/Tighten connections and check for opens in BK wire
	• Defective Interval Governor	• Replace as required with known good governor

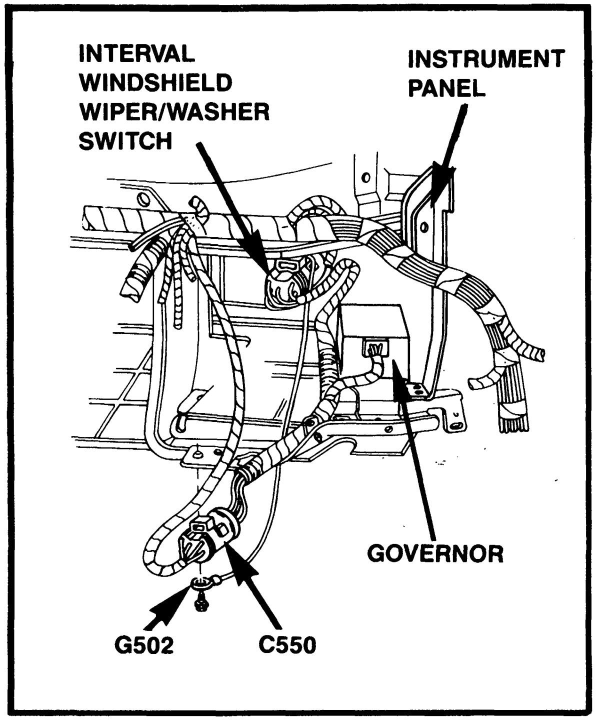


Figure 1 – Behind LH Corner of I/P

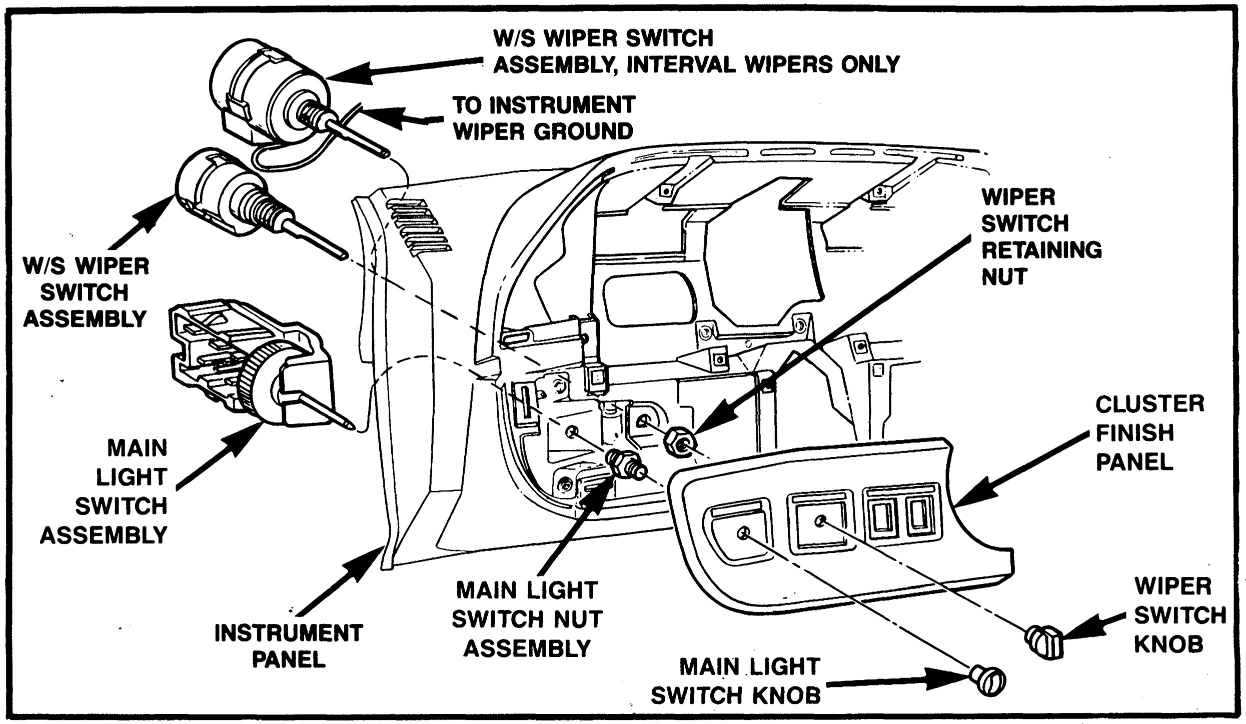
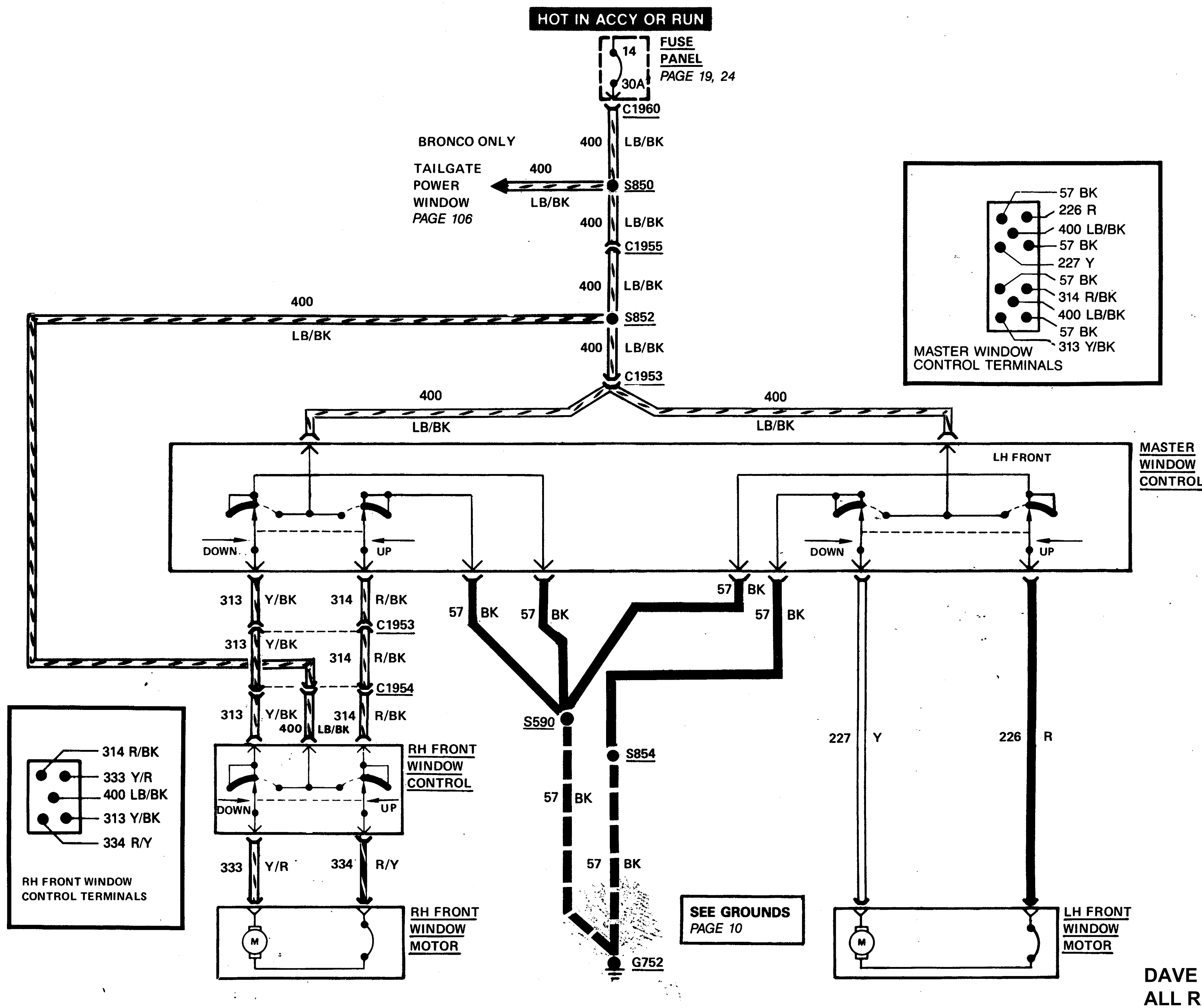


Figure 2 — Main Light Switch



HOT IN ACCY OR RUN
14
30A
FUSE PANEL
PAGE 19, 24
C1960
400 LB/BK
BRONCO ONLY
TAILGATE POWER WINDOW
PAGE 106
400 LB/BK
S850
C1955
S852
C1953
MASTER WINDOW CONTROL
LH FRONT
DOWN
UP
313 Y/BK
314 R/BK
C1954
57 BK
S590
S854
G752
227 Y
226 R
RH FRONT WINDOW CONTROL
333 Y/R
334 R/Y
RH FRONT WINDOW MOTOR
LH FRONT WINDOW MOTOR
SEE GROUNDS
PAGE 10
57 BK
226 R
400 LB/BK
57 BK
227 Y
57 BK
314 R/BK
400 LB/BK
57 BK
313 Y/BK
MASTER WINDOW CONTROL TERMINALS
314 R/BK
333 Y/R
400 LB/BK
313 Y/BK
334 R/Y
RH FRONT WINDOW CONTROL TERMINALS

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, voltage is applied through **Circuit Breaker 14** to the **Master Window Control** and the **RH Window Control**. These controls control voltage through the **Window Motors** in one direction for UP, and they reverse the current direction for DN.

In the "at rest" position, all switches ground both wires of each motor.

To raise the window, voltage is applied through the UP side of the switch, through the motor, through the motor circuit breaker, and through the DN side of the switch to ground.

To lower the window, voltage is applied in the opposite direction.

Refer to section 42-01 of the shop manual.

COMPONENT LOCATION

		Page-Figure
Master Window Control	In LH door	105-2
RH Window Control	In RH door	105-3
Window Motors	In respective doors	105-1

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• No Windows operate	• No voltage at LB/BK wire of Window Control	• Check Circuit Breaker 14 and wiring
	• Poor ground continuity at BK wires from Master Window Control	• Clean/Tighten connections and check wires for opens
	• Frayed or damaged wires or loose connections	• Repair/Replace as required
• One Motor doesn't work	• If passenger's window motor doesn't work, no voltage at Y/BK or R/BK wires of RH Front Window Control	• Repair opens in wires
	• Defective Motor	• Repair/Replace motor as required

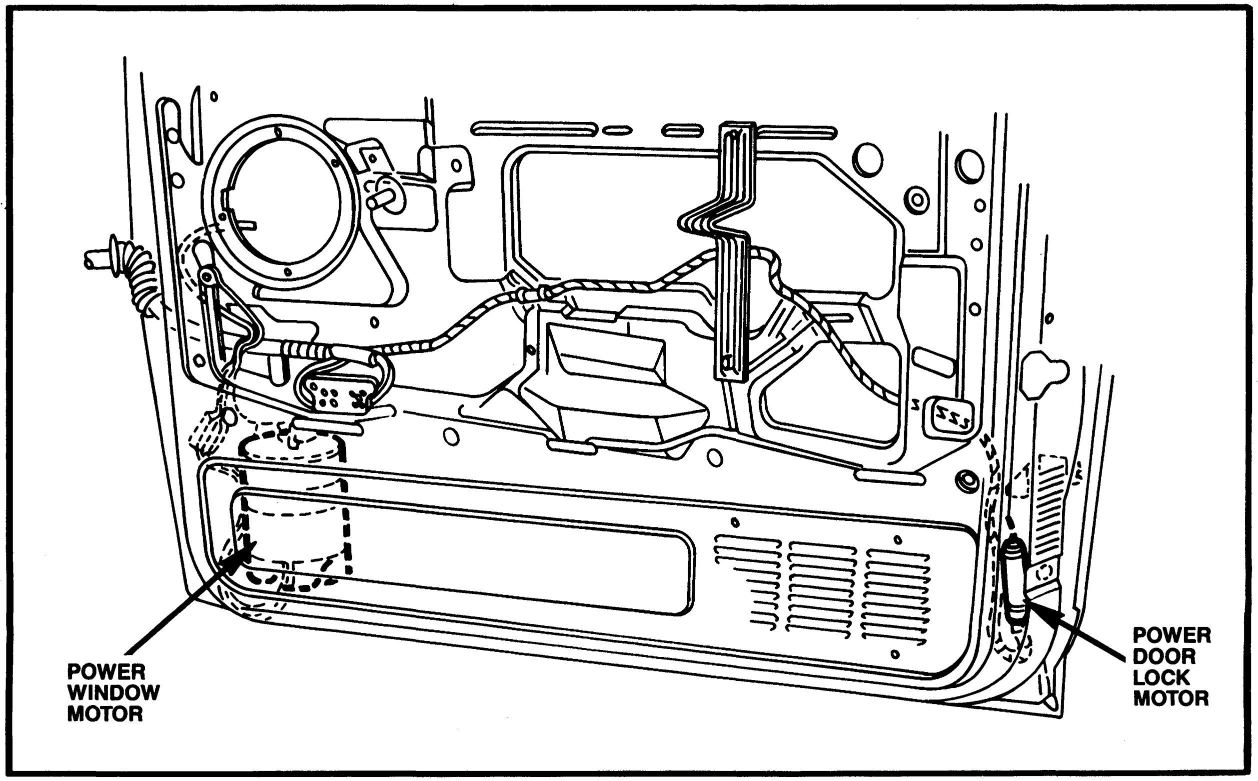


Figure 1 — RH Door

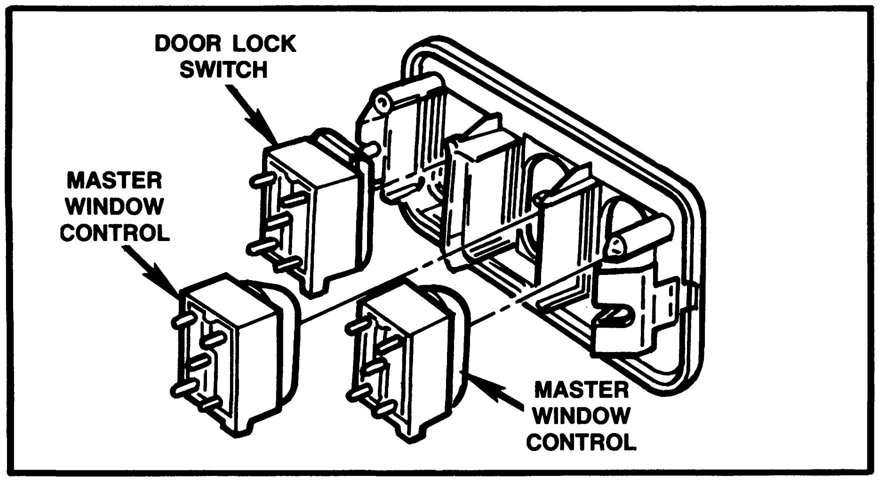


Figure 2 — LH Door

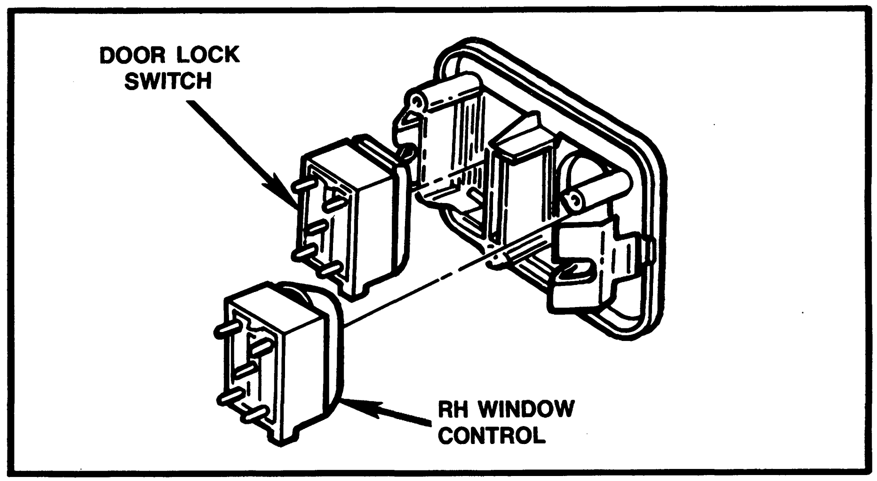
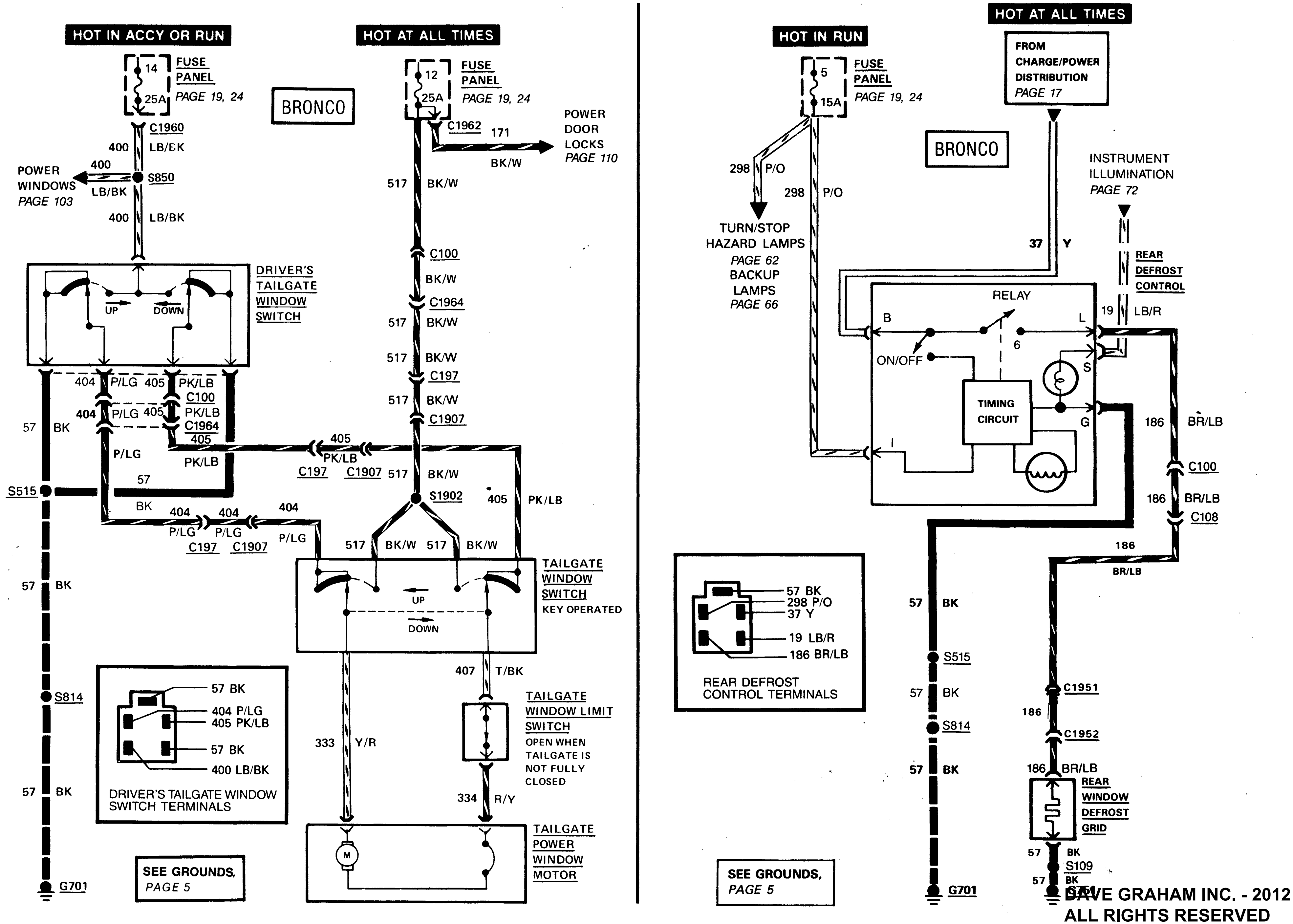


Figure 3 — RH Door

TAILGATE POWER WINDOW/REAR WINDOW DEFROST



HOW THE CIRCUIT WORKS

TAILGATE POWER WINDOW

With **Ignition Switch** in ACCY or RUN, voltage is applied through **Fuse 14** to the **Driver's Tailgate Window Switch** on the instrument panel to run the **Tailgate Power Window Motor.**

The **Tailgate Window Limit Switch** does not allow the motor to run with the tailgate open.

Voltage is applied at all times through **Fuse 12** to the **Key Switch** in the tailgate to run the motor.

Either switch assembly sends current through the motor in one direction for UP, and the opposite direction for DN.

In OFF position, both motor wires are grounded through separate switches.

When the DN switch is pushed, power flows to the DN motor lead. The UP lead acts as ground.

When the UP switch is pushed, power flows to the UP motor lead. The DN lead acts as ground.

Refer to section 42-01 of the shop manual.

COMPONENT LOCATION

Component	Location	Page-Figure
Rear Defrost Control	Under LH corner of I/P	108-2
Driver's Tailgate Window Switch	LH side of I/P	108-2
Fuse Link M	LH fender apron	—
Tailgate Power Window Motor	In center of tailgate	109-3
Tailgate Window Limit Switch	LH latch	—
Key Switch	LH side of tailgate	109-3

Refer to the **Location Index** in the back of the manual for connector, ground, diode, and splice descriptions and locations.

REAR WINDOW DEFROST

With the **Ignition Switch** in RUN, the **Rear Defrost Control** is powered through **Fuse 5.**

Pressing the momentary defrost switch ON closes the contacts of the defrost relay and starts the ten minute (approximate) timing cycle. Current now flows through **Fuel Link M** to the **Rear Window Defrost Grid.** When the defrost switch is released from ON, the solid-state circuitry keeps the defrost relay coil energized.

Pressing the defrost switch OFF drops out the defrost relay. This removes power from the defrost circuit.

If the OFF switch is not pressed, power will remain on until the time delay runs out. Then the coil will drop out and remove power from the defrost circuit.

Refer to section 36-01 of the shop manual.

TROUBLESHOOTING HINTS — TAILGATE POWER WINDOW

CONDITION	POSSIBLE CAUSE	ACTION
• Window works from Key Switch but not from Driver's Switch	• No voltage at LB/BK wire of • Defective Driver's Switch • Frayed or damaged wires or loose connections	• Check Fuse 14 and wiring • Replace with known good switch • Repair/Replace as required
• Window works from Driver's Switch but not from Key Switch	• No voltage at BK/W wires of Key Switch • Defective Key Switch • Frayed or damaged wires or loose connections	• Check Fuse 12 and wiring • Replace with known good switch • Repair/Replace as required

TROUBLESHOOTING HINTS — REAR WINDOW DEFROST

CONDITION	POSSIBLE CAUSE	ACTION
• Defrost does not operate	• No voltage at P/O wire of Defrost Control • No voltage at Y wire of Defrost Control • No voltage at BR/LB wire of Defrost Grid • Defective Defrost Switch Relay	• Check Fuse 5 and wiring • Check Fuse Link M and wiring • Check Rear Defrost Control and wiring • Replace with known good Defrost Control

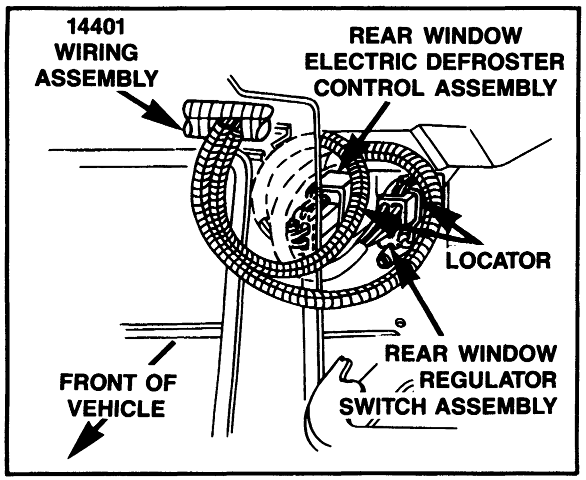


Figure 1 — Rear Window Electric Defrost Control Wiring Installation and Rear Window Regulator Switch Assembly Wiring Installation

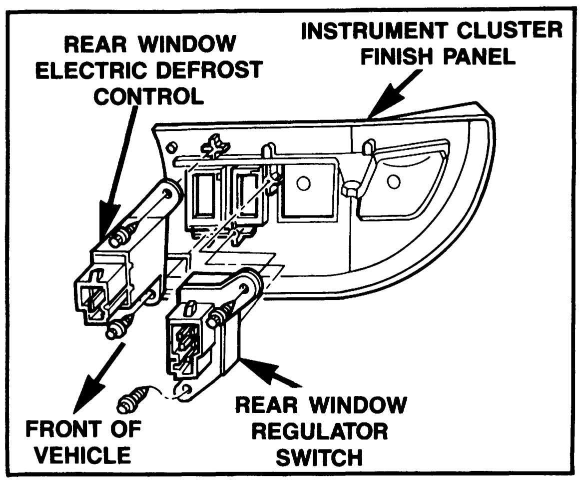


Figure 2 — Rear Window Electric Defrost Control and Rear Window Regulator Switch (Rear View)

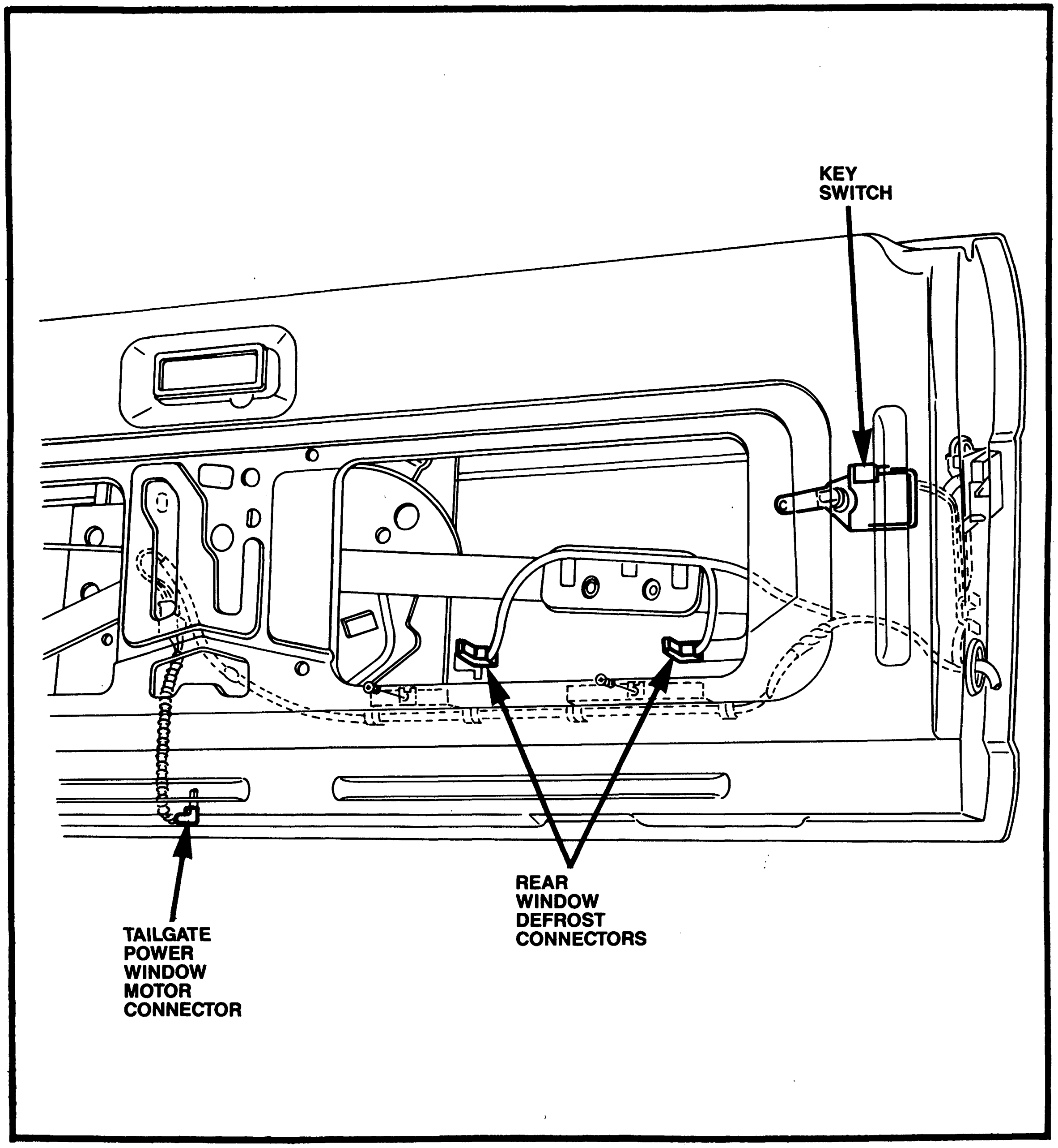


Figure 3—Tailgate (Bronco)

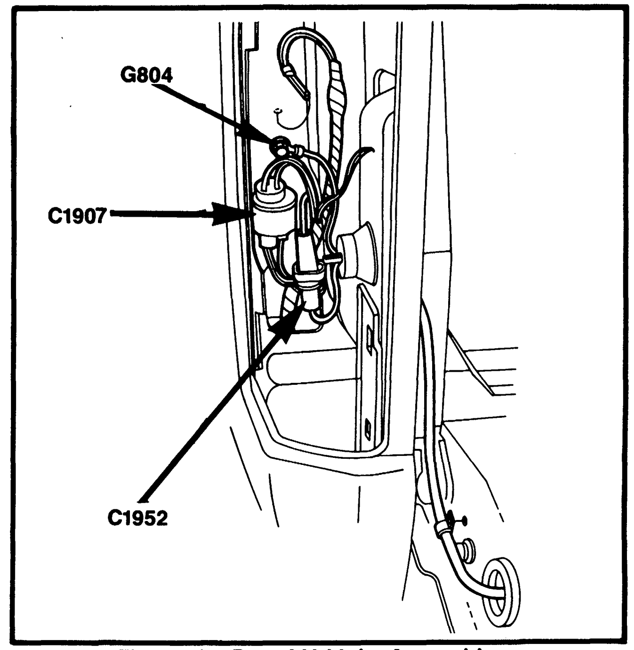


Figure 4—Rear LH Light Assembly

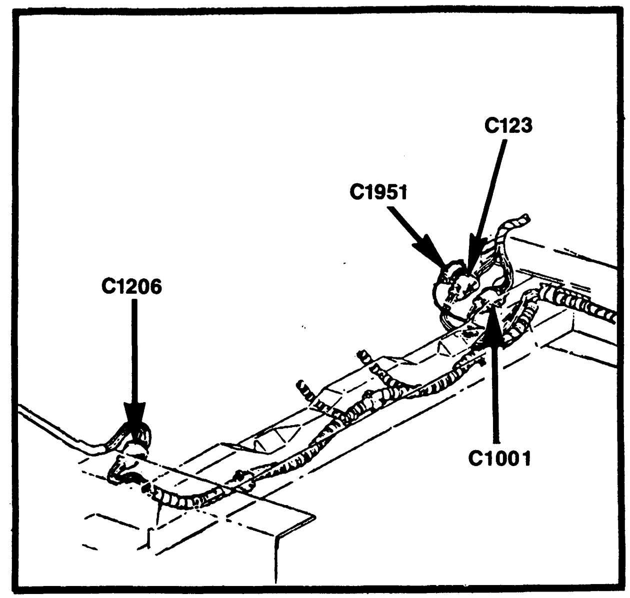
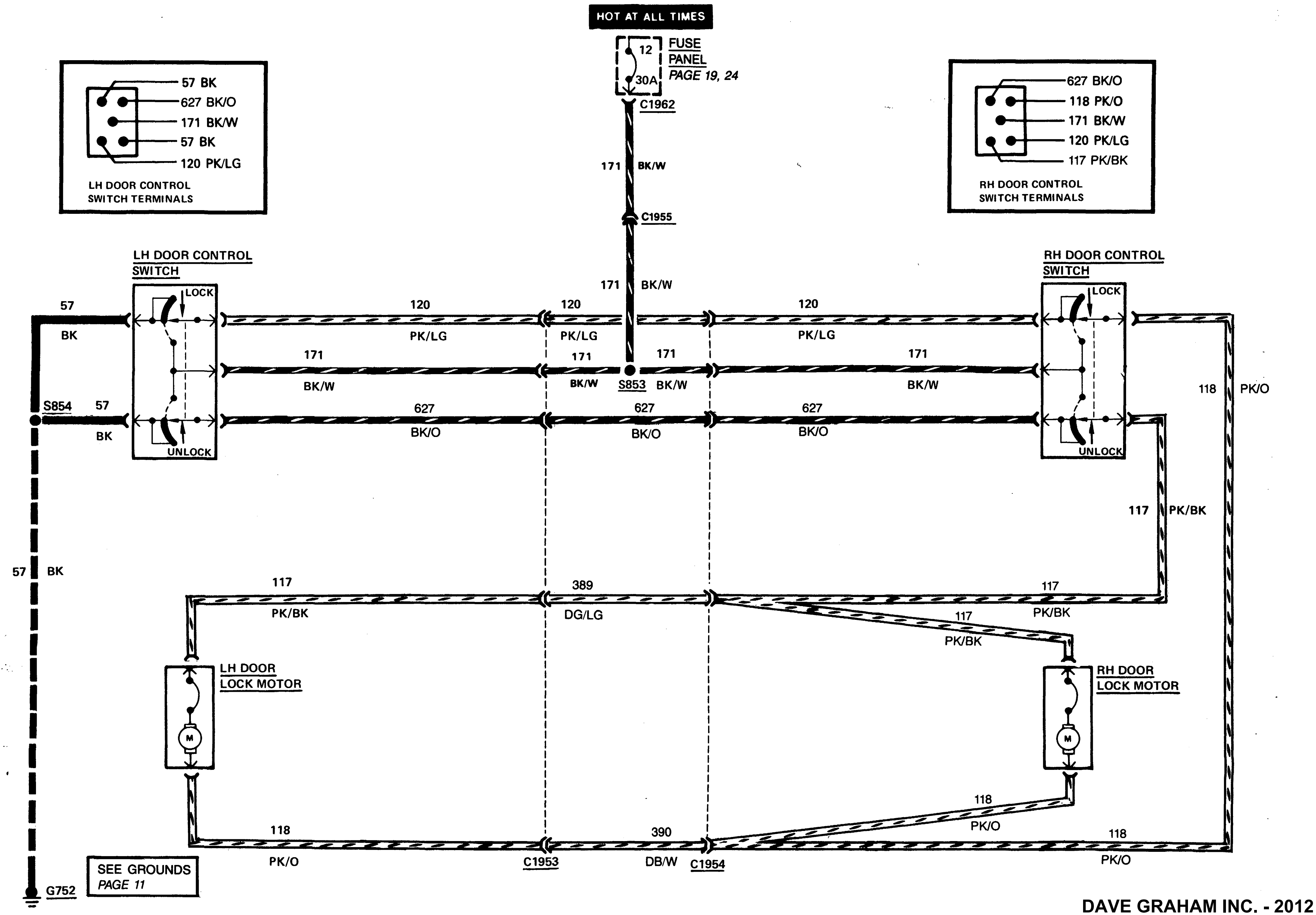


Figure 5—At Rear Crossmember


HOT AT ALL TIMES
12
30A
FUSE PANEL
PAGE 19, 24
C1962
171 BK/W
C1955
171 BK/W
57 BK
627 BK/O
171 BK/W
57 BK
120 PK/LG
LH DOOR CONTROL SWITCH TERMINALS
627 BK/O
118 PK/O
171 BK/W
120 PK/LG
117 PK/BK
RH DOOR CONTROL SWITCH TERMINALS
LH DOOR CONTROL SWITCH
LOCK
UNLOCK
RH DOOR CONTROL SWITCH
57 BK
S854
120 PK/LG
171 BK/W
627 BK/O
S853
118 PK/O
117 PK/BK
117 PK/BK
389 DG/LG
LH DOOR LOCK MOTOR
RH DOOR LOCK MOTOR
M
118 PK/O
390 DB/W
C1953
C1954
G752
SEE GROUNDS PAGE 11

HOW THE CIRCUIT WORKS

Power Door Locks are powered through **Circuit Breaker 12** (hot at all times).

When either **Door Control Switch** is pressed to LOCK, voltage is applied to both **Door Lock Motors.** The motors turn in the direction to lock the locks. When either switch is pressed to UNLOCK, voltage of opposite potential is sent to the **Door Lock Motors,** turning them in the UNLOCK direction. When "at rest," the switches are grounded.

Refer to section 44-01 of the shop manual.

COMPONENT LOCATION

		Page-Figure
Door Lock Motors	In respective door	105-1
Door Lock Switches	In respective doors	105-2,3

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• No Locks work	• No voltage at BK/W wire of C1962	• Check Circuit Breaker 12 and wiring
• One door does not lock (unlock)	• Defective Motor • Frayed or damaged wiring or loose connections	• Repair/Replace with known good motor • Repair/Replace as required
• One Switch does not work	• Frayed or damaged wiring or loose connections • Defective Switch	• Repair/Replace as required • Replace with known good switch

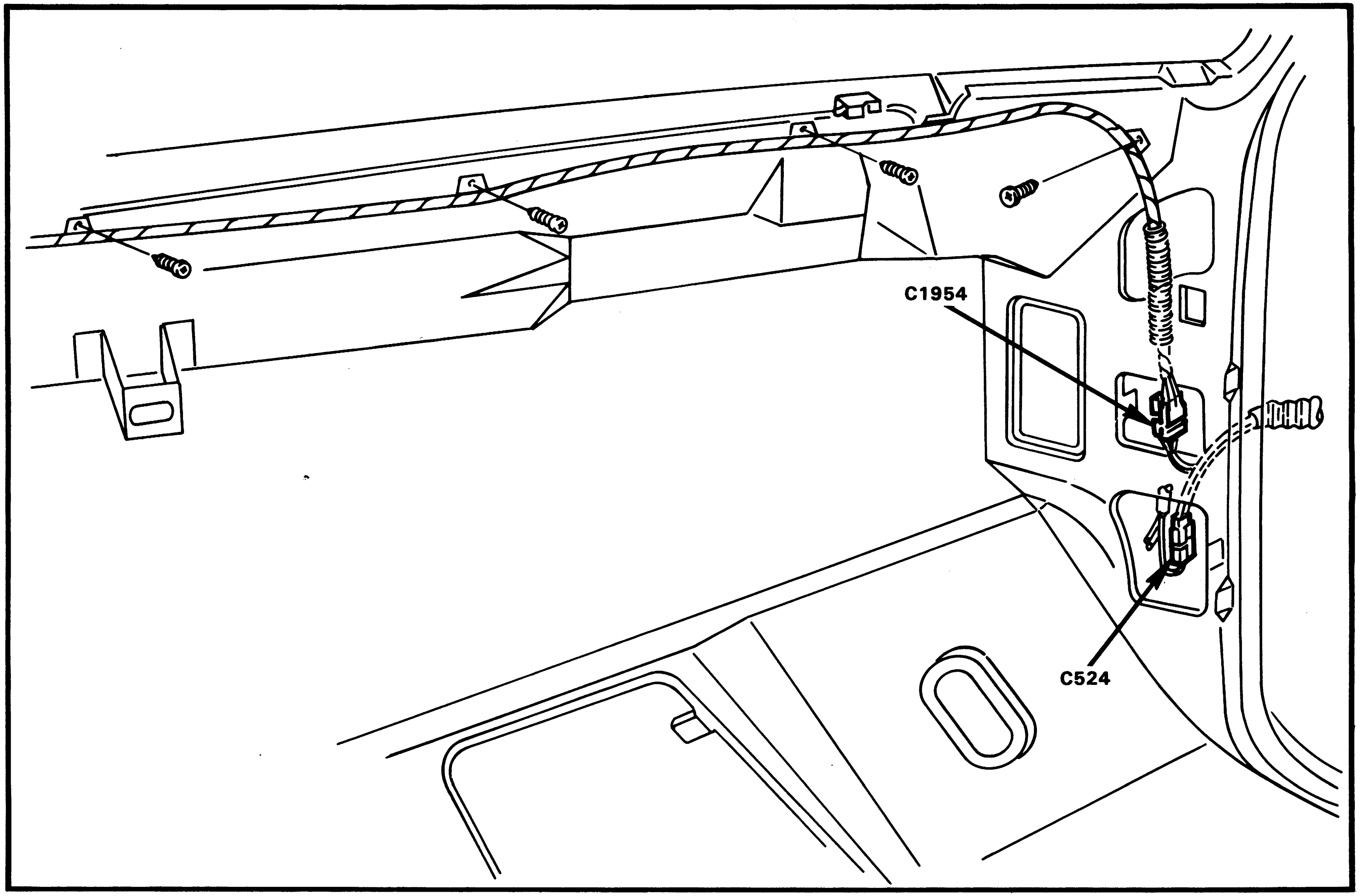
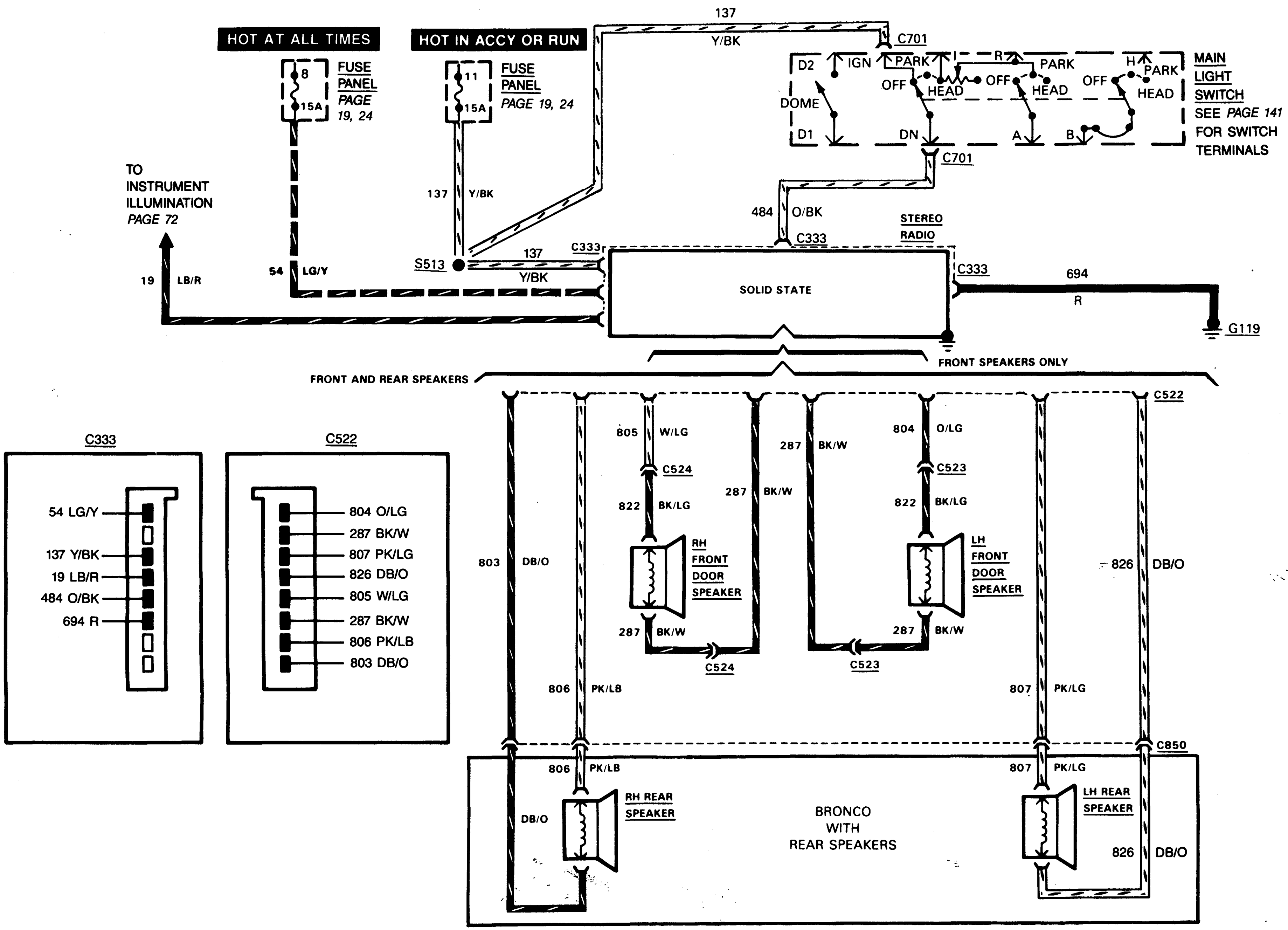


Figure 1 —RH Cowl Center Access Hole


HOT AT ALL TIMES
HOT IN ACCY OR RUN
FUSE PANEL PAGE 19, 24
8
15A
FUSE PANEL PAGE 19, 24
11
15A
137
Y/BK
C701
D2
IGN
PARK
R
PARK
H
PARK
OFF
HEAD
OFF
HEAD
OFF
HEAD
DOME
D1
DN
A
B
MAIN LIGHT SWITCH
SEE PAGE 141 FOR SWITCH TERMINALS
C701
TO INSTRUMENT ILLUMINATION PAGE 72
137 Y/BK
484 O/BK
C333
STEREO RADIO
19 LB/R
54 LG/Y
S513
137
Y/BK
C333
SOLID STATE
C333
694
R
G119
FRONT SPEAKERS ONLY
FRONT AND REAR SPEAKERS
C522
805 W/LG
C524
822 BK/LG
287 BK/W
287 BK/W
804 O/LG
C523
822 BK/LG
803 DB/O
RH FRONT DOOR SPEAKER
LH FRONT DOOR SPEAKER
826 DB/O
287 BK/W
C524
287 BK/W
C523
806 PK/LB
807 PK/LG
C850
806 PK/LB
RH REAR SPEAKER
DB/O
BRONCO WITH REAR SPEAKERS
807 PK/LG
LH REAR SPEAKER
826 DB/O
C333
54 LG/Y
137 Y/BK
19 LB/R
484 O/BK
694 R
C522
804 O/LG
287 BK/W
807 PK/LG
826 DB/O
805 W/LG
287 BK/W
806 PK/LB
803 DB/O

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in ACCY or RUN, voltage is applied through **Fuse 11** to operate the radio. Circuit number 54 powers the Radio Memory. Circuit number 484 powers the LCD Radio Lighting.

Stereo Radio

The AM/FM/MPX **Stereo Radio** has two **Front Door Speakers** and two optional **Rear Speakers** (Bronco only).

Refer to section 35-01 of the shop manual.

COMPONENT LOCATION

		Page-Figure
Main Light Switch	Lower I/P, left of steering column	102-2
Refer to Component Testing Page 141 for additional testing details.		
Radio	Center of I/P	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Radio does not work	• No voltage at Y/BK wire of Radio	• Check Fuse 11 and wiring
• Radio Memory, Display and Clock do not work	• No voltage at LG/Y wire of Radio	• Check Fuse 8 and wiring

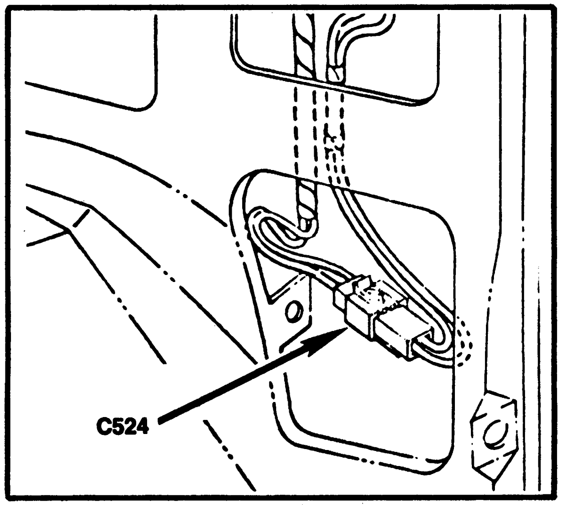


Figure 1—RH Lower Shroud Access Hole

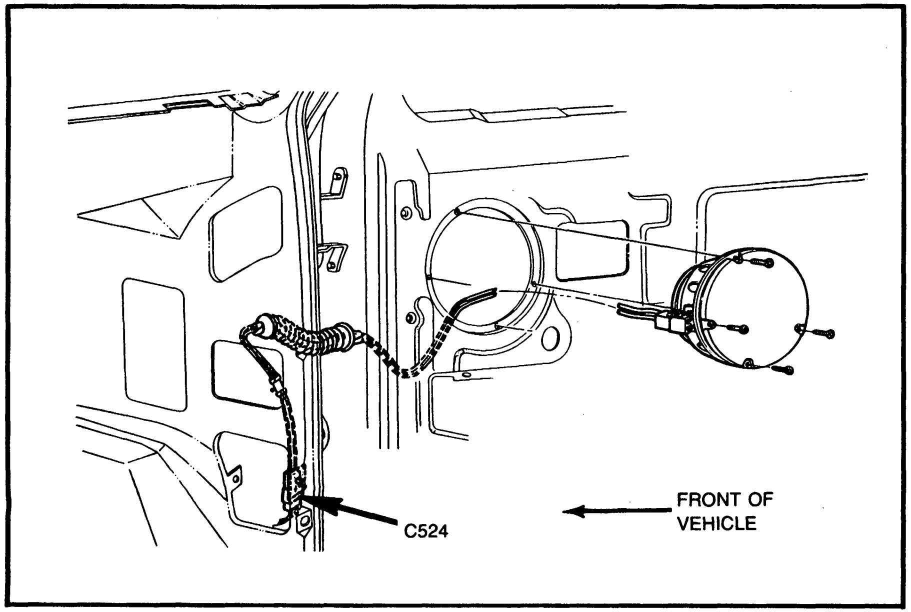


Figure 2 - Speaker Assembly R.H. Side

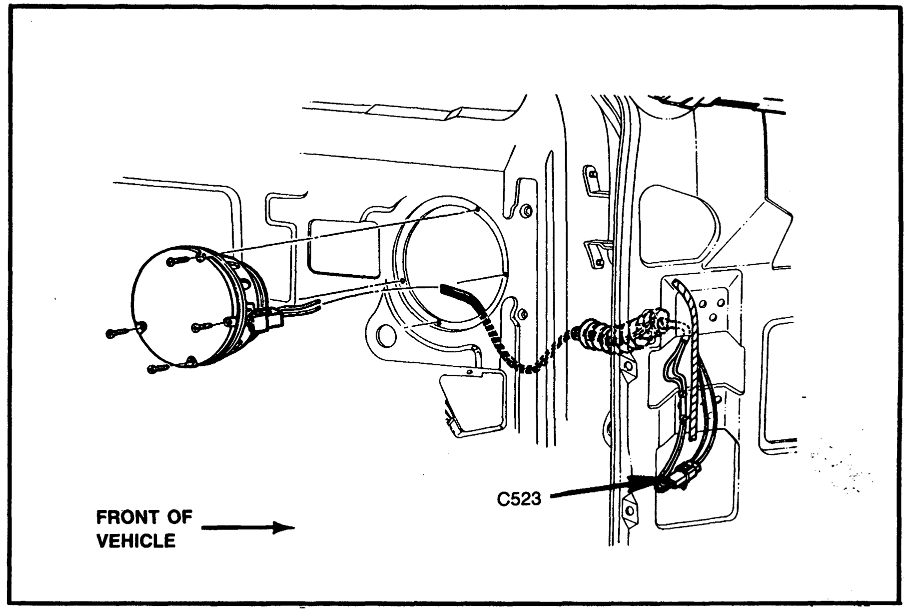


Figure 3 - Speaker Assembly L.H. Side

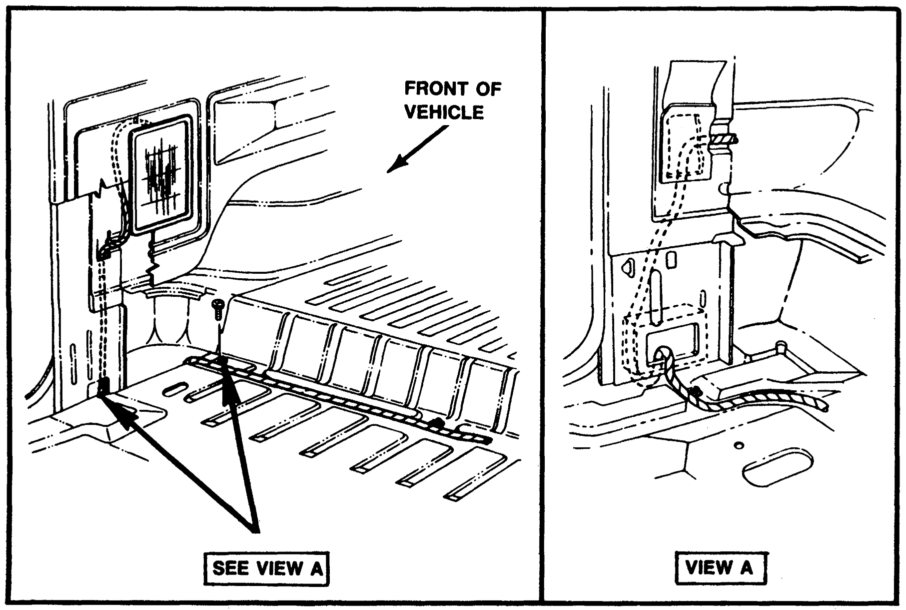


Figure 4 - Rear Sear Speaker R.H. Side (Bronco)

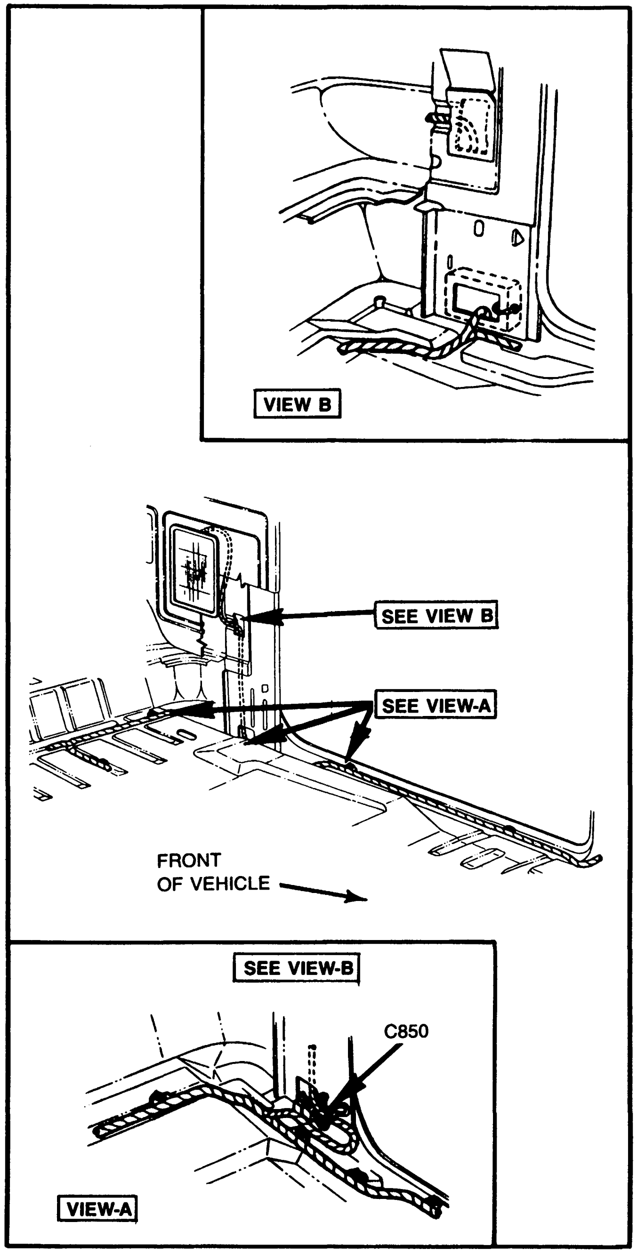


Figure 5 – Rear Seat Speaker L.H. Side (Bronco)

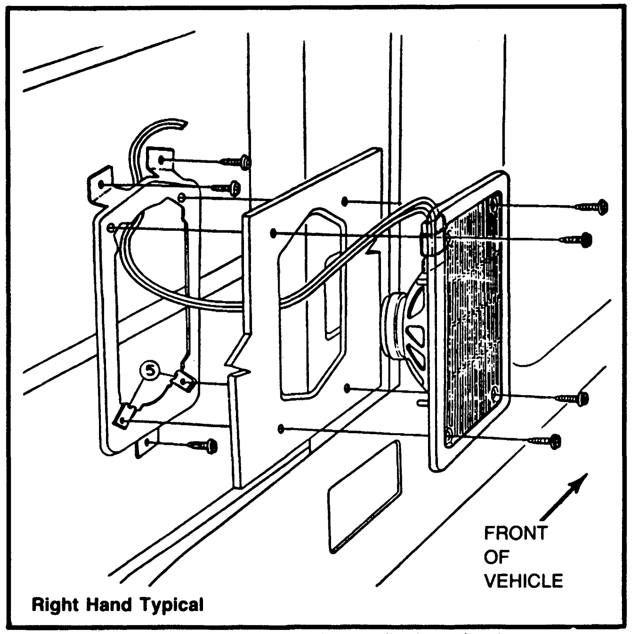
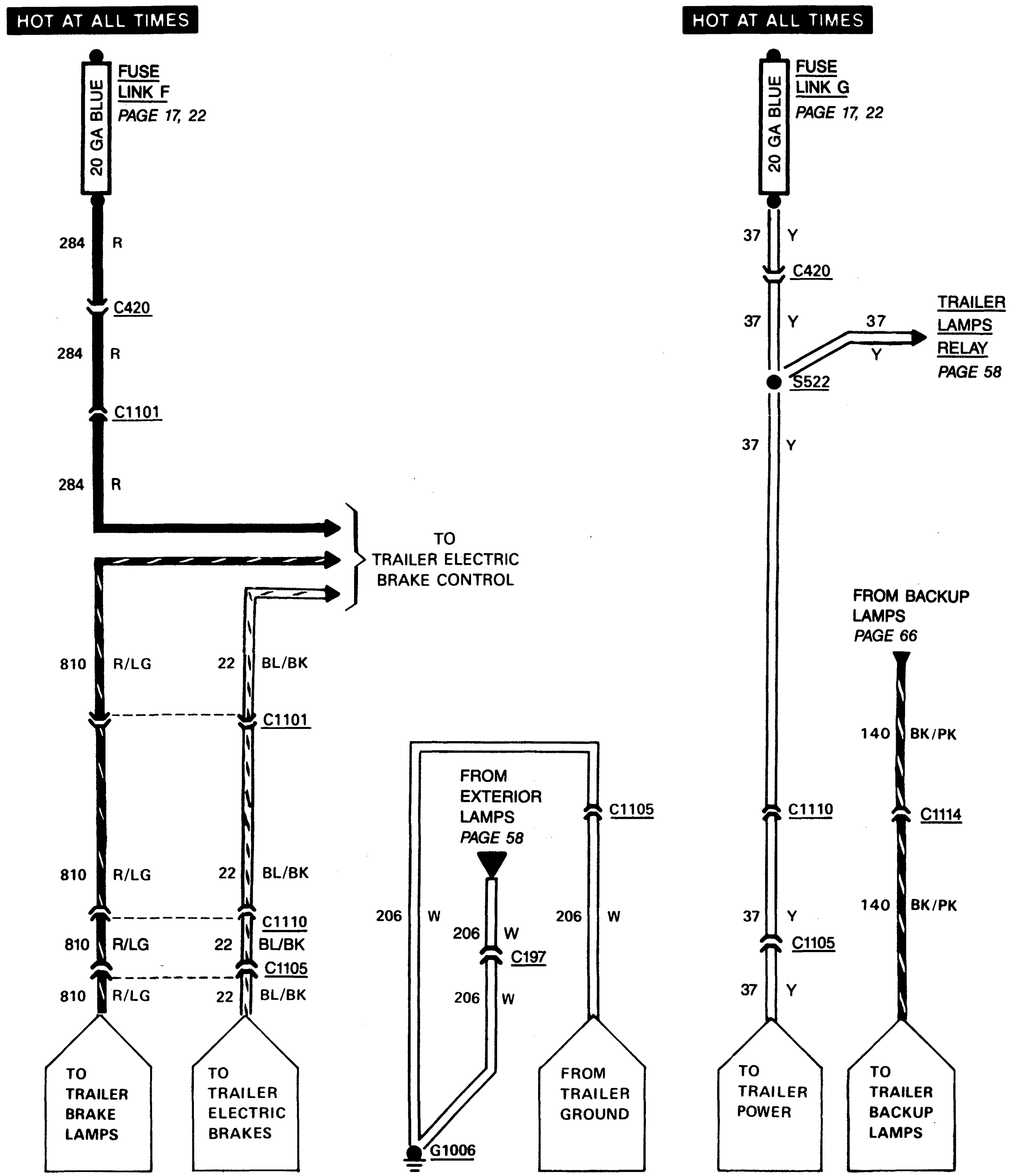


Figure 6 – Rear Seat Speaker Installation (Bronco)


HOT AT ALL TIMES
20 GA BLUE
FUSE LINK F
PAGE 17, 22
284 R
C420
284 R
C1101
284 R
TO TRAILER ELECTRIC BRAKE CONTROL
810 R/LG
22 BL/BK
C1101
810 R/LG
22 BL/BK
C1110
810 R/LG
22 BL/BK
C1105
810 R/LG
22 BL/BK
TO TRAILER BRAKE LAMPS
TO TRAILER ELECTRIC BRAKES
FROM EXTERIOR LAMPS
PAGE 58
206 W
206 W
C197
206 W
C1105
206 W
G1006
FROM TRAILER GROUND
HOT AT ALL TIMES
20 GA BLUE
FUSE LINK G
PAGE 17, 22
37 Y
C420
37 Y
37 Y
TRAILER LAMPS RELAY
PAGE 58
S522
37 Y
C1110
37 Y
C1105
37 Y
TO TRAILER POWER
FROM BACKUP LAMPS
PAGE 66
140 BK/PK
C1114
140 BK/PK
TO TRAILER BACKUP LAMPS

HOW THE CIRCUIT WORKS

Power for the **Camper** or **Trailer** circuits is provided through fuse links at the **Starter Relay**. Trailer exterior lamps and accessories are powered through **Fuse Link G**. Trailer brakes and brake lamps are powered through **Fuse Link F**.

Refer to section 32-01 of the shop manual.

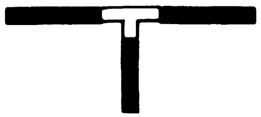
COMPONENT LOCATION

		Page-Figure
Fuse Link F, G	At starter relay	—

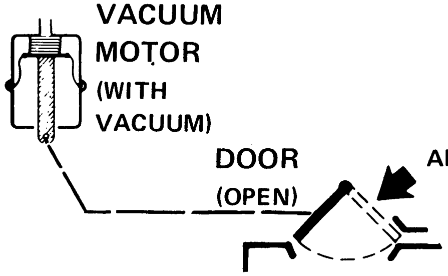
Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

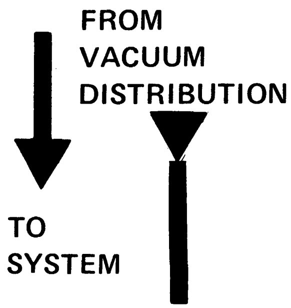
CONDITION	POSSIBLE CAUSE	ACTION
• Trailer Lamps don't light	• No voltage at R or Y wires of circuit	• Check Fuse Links F and G and wiring
	• Poor in-line circuit connections	• Clean/Tighten and/or repair open in wiring



"T" JUNCTION

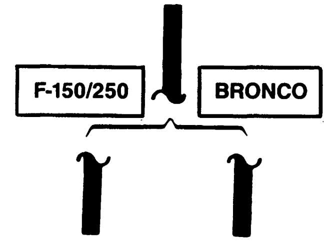


VACUUM ON VACUUM MOTOR PULLS DOOR OPEN TO LET AIR PASS THROUGH



"CUT" HOSES REFERENCED BETWEEN PAGES

ARROW SHOWS VACUUM FLOW FROM MANIFOLD FITTING TO COMPONENT

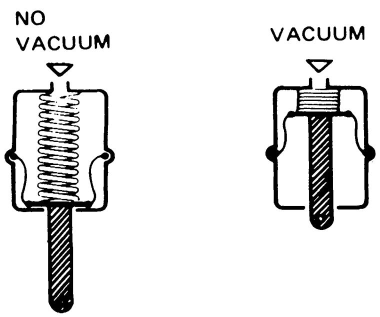


ALTERNATE VACUUM PATHS

> **NOTE**
>
> Other vacuum symbols used on vacuum system diagrams are fully explained on those pages.

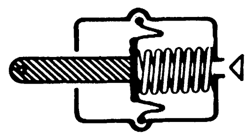
VACUUM MOTOR OPERATIONS

SINGLE DIAPHRAGM MOTOR



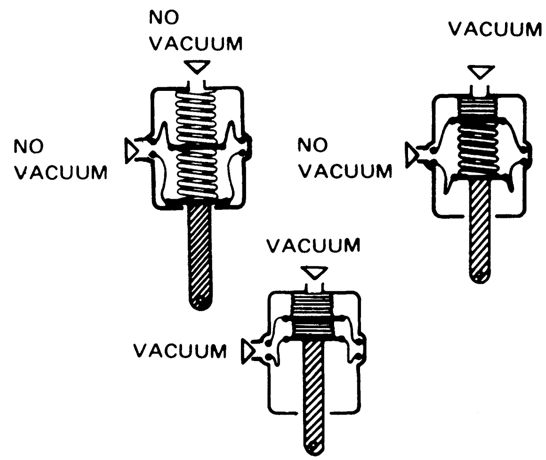
Vacuum motors operate like electrical solenoids, mechanically pushing or pulling a shaft between two fixed positions. When vacuum is applied, the shaft is pulled in. When no vacuum is applied, the shaft is pushed all the way out by a spring.

SERVO MOTOR



Some vacuum motors such as the **Servo Motor** in the **Speed Control** can position the actuating arm at any position between fully extended and fully retracted. The **Servo** is operated by a control valve that applies varying amounts of vacuum to the motor. The higher the vacuum level, the greater retraction of the motor arm. **Servo Motors** work exactly the same as the two-position motors; the only difference is in the way the vacuum is applied. **Servo Motors** are generally larger and provide a calibrated control.

DOUBLE DIAPHRAGM MOTOR



A double diagram motor has three positions and is really two motors in one housing. When the top port gets vacuum, the shaft pulls half-way in. When both ports get vacuum, the shaft pulls all the way in.

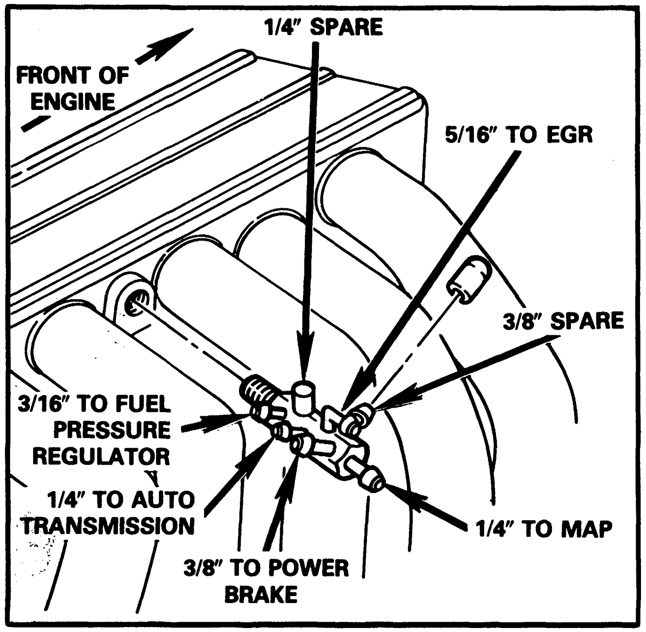


Figure 1 – 4.9L

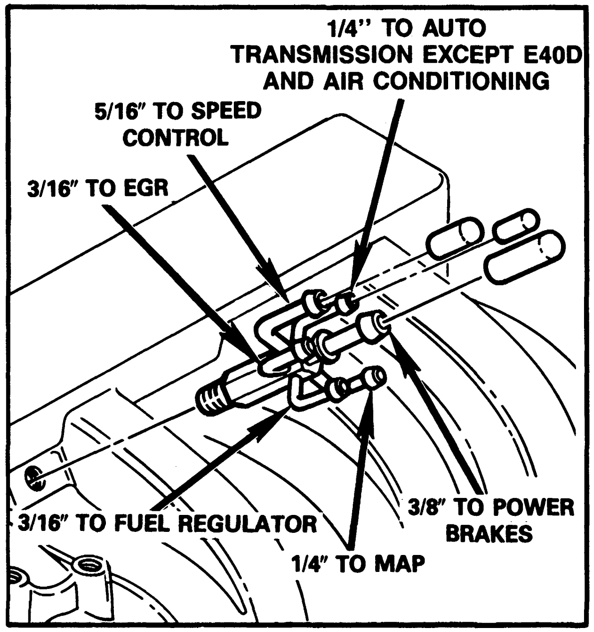


Figure 2 — 5.0L

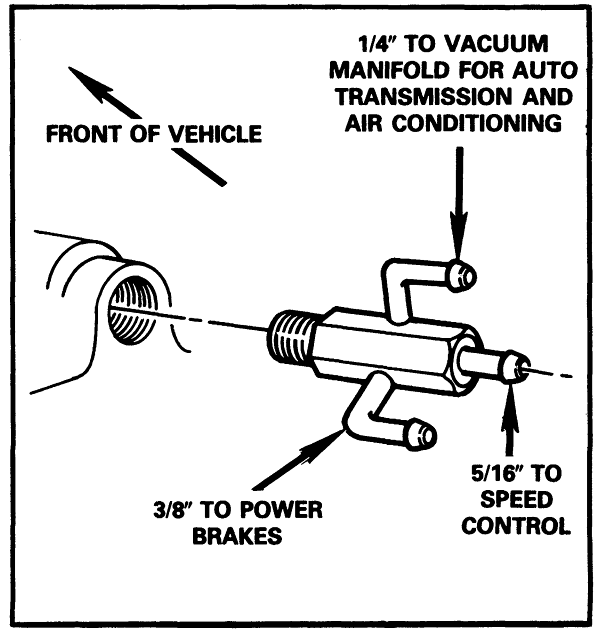


Figure 3 — 7.5L

TROUBLESHOOTING STEPS

These six steps present an orderly method of troubleshooting:

Step 1. Verify the problem.
- Operate the complete system and see all symptoms for yourself in order to:
  — check the accuracy and completeness of the customer's complaint.
  —learn more that might give a clue to the nature and location of the problem.

Step 2. Narrow the problem.
- Using the EVTM, narrow down the possible causes and locations of the problem in order to more quickly find the exact cause.

Step 3. Test the cause.
- Use test procedures to find the specific cause of the symptoms.

Step 4. Verify the cause.
- Confirm the fact that you have found the correct cause through operating the parts of the circuit you think are good.

Step 5. Make the repair.
- Repair or replace the faulty component.

Step 6. Verify the repair.
- Operate the system as in Step 1 and check that your repair has removed all symptoms, and also has not caused any new symptoms.

TROUBLESHOOTING TESTS

> NOTE
> Vacuum system problems fall into three groups:
> 1. *Leaks* in hoses, connectors, or motor diaphragms.
> 2. *Pinched Lines* or *Clogged Valves*.
> 3. *Faulty mechanical operation* of parts driven by vacuum motors.

Vacuum Supply Test

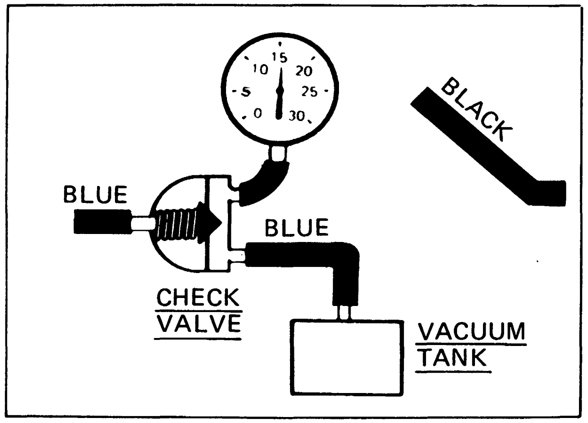


Figure 1 — System Supply Test

1. Connect **Vacuum Tester** to system side of **Check Valve** (Figure 1).
2. Start engine. Gauge should show approximately 15" of vacuum.
3. Turn off engine. Watch gauge.
   —If vacuum holds, supply OK.
   —If vacuum fails, replace **Check Valve** or **Tank.**

Leak Test

1. Connect **Vacuum Gauge** and **Vacuum Pump** (Figure 3) to system hose in place of tank.
2. Open valve and start pump. Operate controls in all modes.
3. Listen for hiss, watch gauge.

> NOTE
> Hissing is normal at **Function Control** when changing modes.

If system hisses or loses vacuum, find system leak as follows:

1. Turn on **Vacuum Pump** and check for vacuum build-up.
2. Stop pump, vacuum should drop due to leak.
3. Clamp supply hoses with needle-nose pliers one at a time until vacuum stops dropping (Figure 3).
4. Check vacuum schematic to find components in that line.
5. Clamp hoses through circuit to find leak.

Component Test

1. Connect **Vacuum Tester** (Figure 2) to component.
2. Pump **Vacuum Tester** and check that component operates correctly and vacuum holds.
3. Replace component if vacuum doesn't hold.

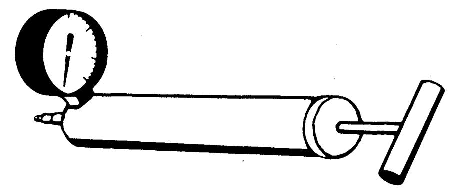


Figure 2 — Vacuum Tester

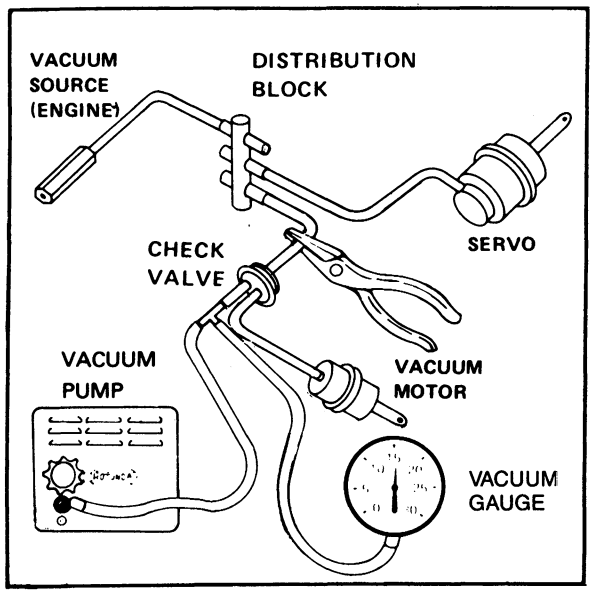
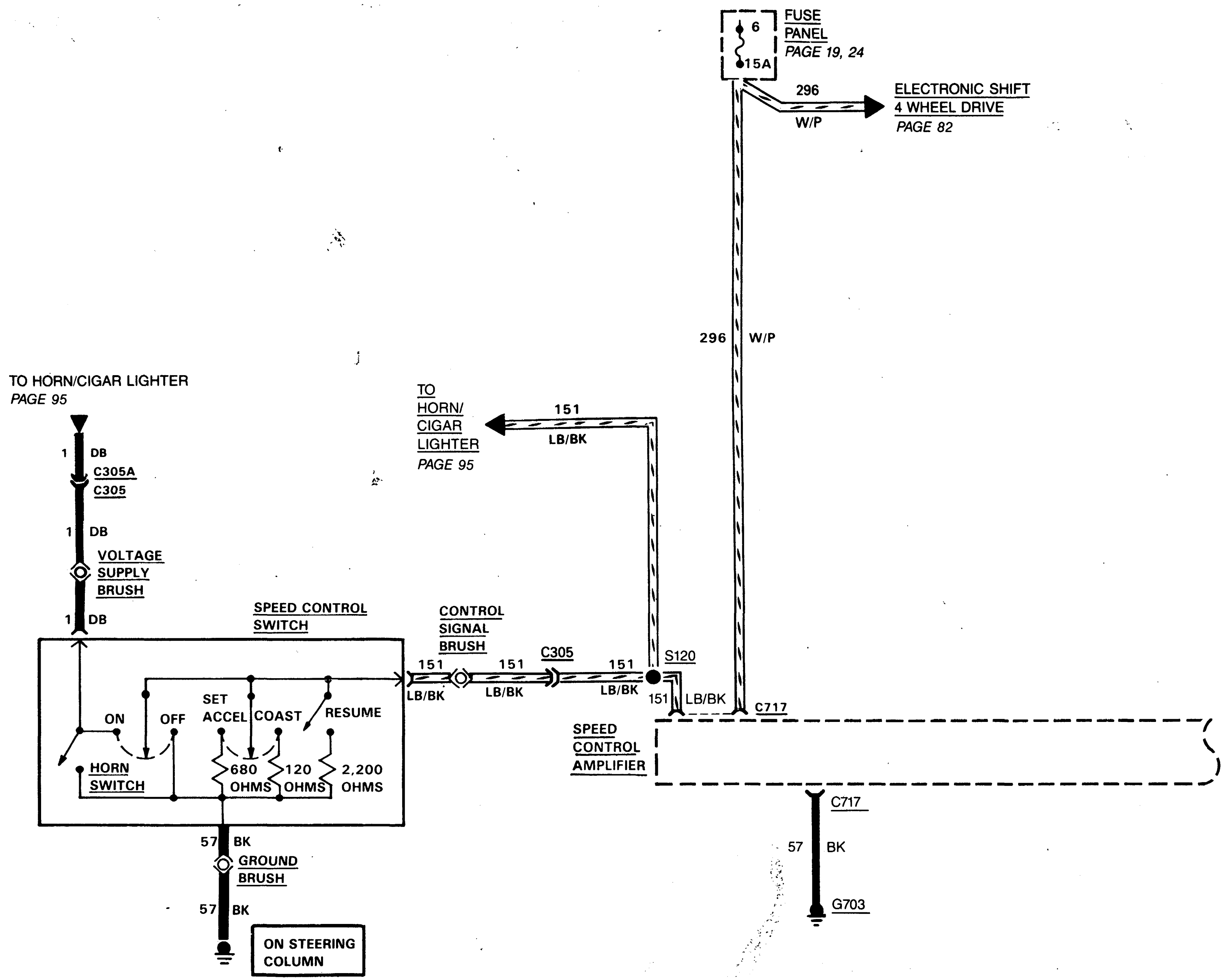
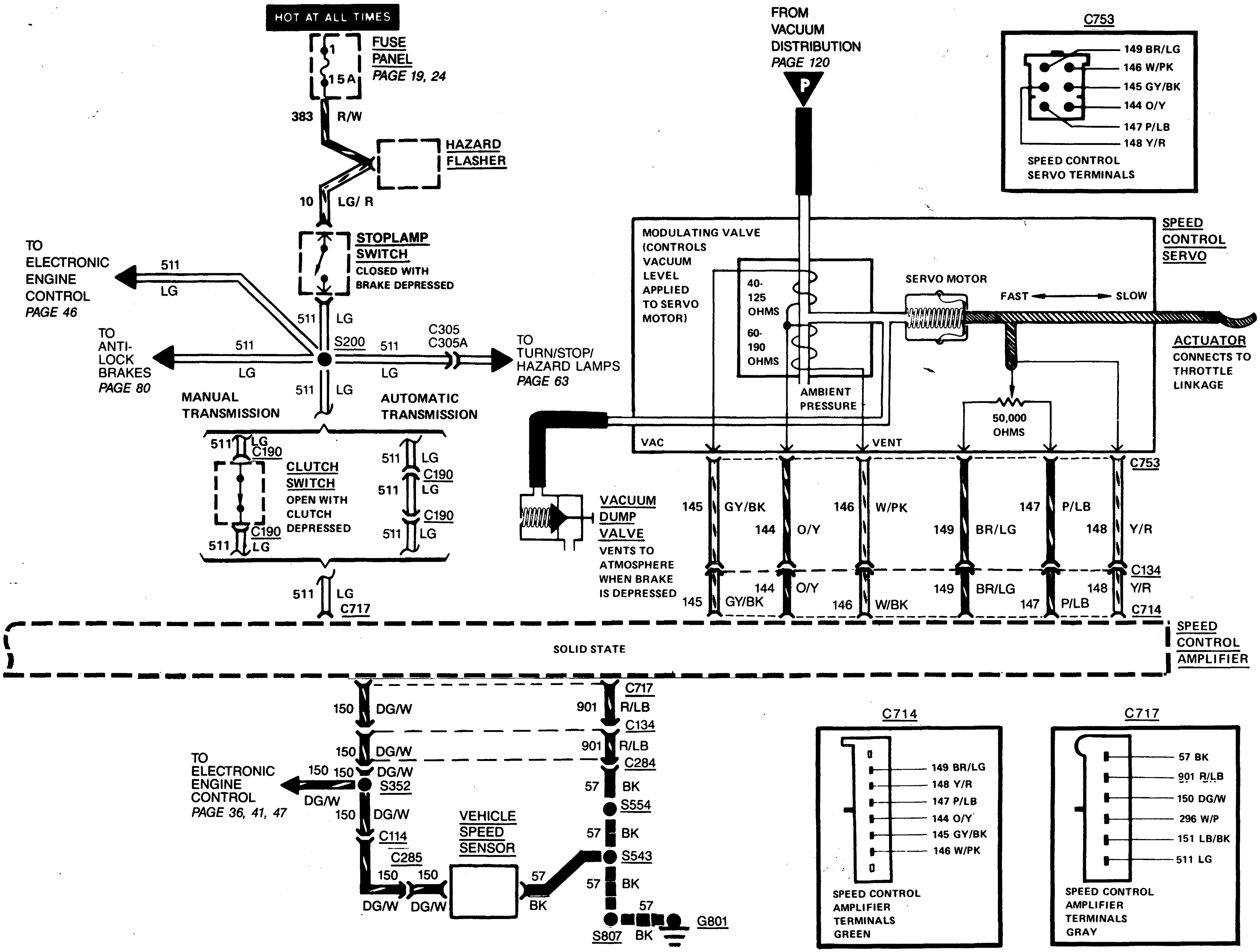


Figure 3 — Testing For Leak In Typical Vacuum System



FUSE PANEL
PAGE 19, 24
6
15A
296
W/P
ELECTRONIC SHIFT 4 WHEEL DRIVE
PAGE 82
296 W/P
TO HORN/CIGAR LIGHTER
PAGE 95
1 DB
C305A
C305
1 DB
VOLTAGE SUPPLY BRUSH
1 DB
TO HORN/ CIGAR LIGHTER
PAGE 95
151
LB/BK
SPEED CONTROL SWITCH
CONTROL SIGNAL BRUSH
151 LB/BK
151 LB/BK
C305
151 LB/BK
S120
151 LB/BK
C717
ON
OFF
SET ACCEL
COAST
RESUME
HORN SWITCH
680 OHMS
120 OHMS
2,200 OHMS
SPEED CONTROL AMPLIFIER
C717
57 BK
G703
57 BK
GROUND BRUSH
57 BK
ON STEERING COLUMN


HOT AT ALL TIMES
FUSE PANEL
PAGE 19, 24
1
15A
383
R/W
HAZARD FLASHER
10
LG/ R
STOPLAMP SWITCH
CLOSED WITH BRAKE DEPRESSED
TO ELECTRONIC ENGINE CONTROL
PAGE 46
511
LG
TO ANTI-LOCK BRAKES
PAGE 80
S200
C305
C305A
TO TURN/STOP/ HAZARD LAMPS
PAGE 63
MANUAL TRANSMISSION
AUTOMATIC TRANSMISSION
C190
CLUTCH SWITCH
OPEN WITH CLUTCH DEPRESSED
C717
FROM VACUUM DISTRIBUTION
PAGE 120
P
MODULATING VALVE (CONTROLS VACUUM LEVEL APPLIED TO SERVO MOTOR)
40-125 OHMS
60-190 OHMS
AMBIENT PRESSURE
SERVO MOTOR
FAST
SLOW
SPEED CONTROL SERVO
ACTUATOR
CONNECTS TO THROTTLE LINKAGE
50,000 OHMS
VAC
VENT
C753
VACUUM DUMP VALVE
VENTS TO ATMOSPHERE WHEN BRAKE IS DEPRESSED
145 GY/BK
144 O/Y
146 W/PK
149 BR/LG
147 P/LB
148 Y/R
C134
145 GY/BK
144 O/Y
146 W/BK
149 BR/LG
147 P/LB
148 Y/R
C714
SOLID STATE
SPEED CONTROL AMPLIFIER
150 DG/W
901 R/LB
C717
C134
C284
TO ELECTRONIC ENGINE CONTROL
PAGE 36, 41, 47
S352
C114
C285
VEHICLE SPEED SENSOR
57 BK
S554
S543
S807
G801
C753
149 BR/LG
146 W/PK
145 GY/BK
144 O/Y
147 P/LB
148 Y/R
SPEED CONTROL SERVO TERMINALS
C714
149 BR/LG
148 Y/R
147 P/LB
144 O/Y
145 GY/BK
146 W/PK
SPEED CONTROL AMPLIFIER TERMINALS GREEN
C717
57 BK
901 R/LB
150 DG/W
296 W/P
151 LB/BK
511 LG
SPEED CONTROL AMPLIFIER TERMINALS GRAY

HOW THE CIRCUIT WORKS

The **Speed Control Amplifier** controls vacuum to the **Speed Control Servo** motor through the modulating valve. The servo motor moves the throttle through the **Actuator** (cable or bead chain).

To operate the **Speed Control System**, the engine must be running and the car speed faster than 30 mph. The system is turned on by pressing the ON switch of the **Speed Control Switch**.

Pressing and releasing SET/ACCEL or COAST sends a command to hold the present speed. This speed is now the *set speed.* The **Speed Sensor** (in the transmission) sends signals to the **Speed Control Amplifier.** These signals tell the amplifier to increase or decrease the vacuum at the servo motor to keep the truck at the *set speed.*

Pressing and holding SET/ACCEL speeds the truck up. The truck speed increases as long as SET/ACCEL is depressed. Releasing SET/ACCEL gives the system a new *set speed* to maintain. Truck speed may also be increased by depressing the accelerator until the higher speed is reached, then pressing and releasing SET/ACCEL.

Pressing and holding COAST slows the truck down. The truck speed decreases as long as COAST is depressed. Releasing COAST gives the system a new *set speed* to maintain.

Pressing OFF turns the system off (grounds **LB/BK** wire). The system is also turned off when the brake pedal is depressed (power through **LG/R** and **LG** wire) or the **Ignition Switch** is turned OFF. The **Vacuum Dump Valve** also operates when the brake pedal is depressed. This is a backup device to turn off the system. In trucks with manual transmission, the **Clutch Switch** opens when the clutch pedal is depressed and turns off the system.

When the system has been deactivated by depressing the brake or clutch pedal, the last *set speed* may be resumed by pressing RESUME. This feature will not work if OFF has been depressed or if truck speed is below 30 mph.

Refer to section 37-01 of the shop manual.

COMPONENT LOCATION

Component	Location	Page-Figure
Hazard Flasher	On back of fuse panel	—
Clutch Switch	Attached to bracket at top of clutch pedel	—
Horn Switch	Mounted in steering wheel hub assembly	—
Speed Control Amplifier	Behind I/P at RH side of steering column	97-2
Speed Control Servo	On LH inner fender next to master brake cylinder	—
Speed Control Switch	Mounted in steering wheel hub assembly	—
Speed Sensor	On transmission	—
Stoplamp Switch	Mounted to bracket at top of brake pedal	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Speed Control does not operate	• No voltage at W/P wire of Speed Control Amplifier	• Check Fuse 6 and wiring
	• Poor ground connection at BK wire of Speed Control Amplifier	• Clean/Tighten connection and check for open in wiring
	• Open wires and/or damaged hoses	• Repair/Replace as required
	• Actuator cable has more than 1/8 inch free play	• Adjust as required
	• Speed Control Servo binding	• Repair as required
	• Throttle linkage binding	• Repair as required

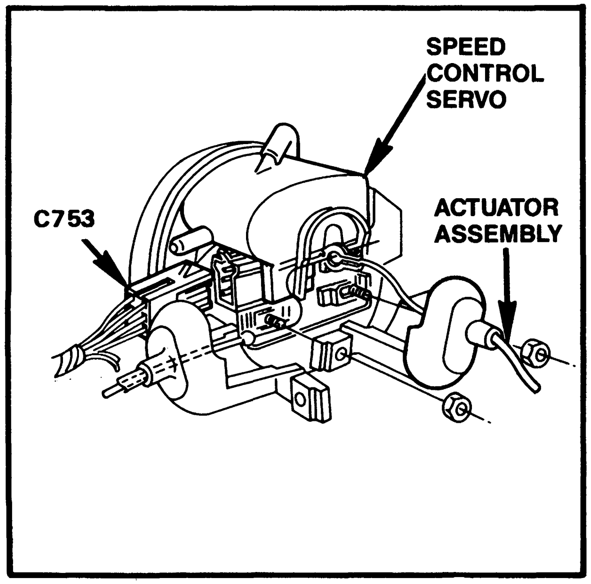
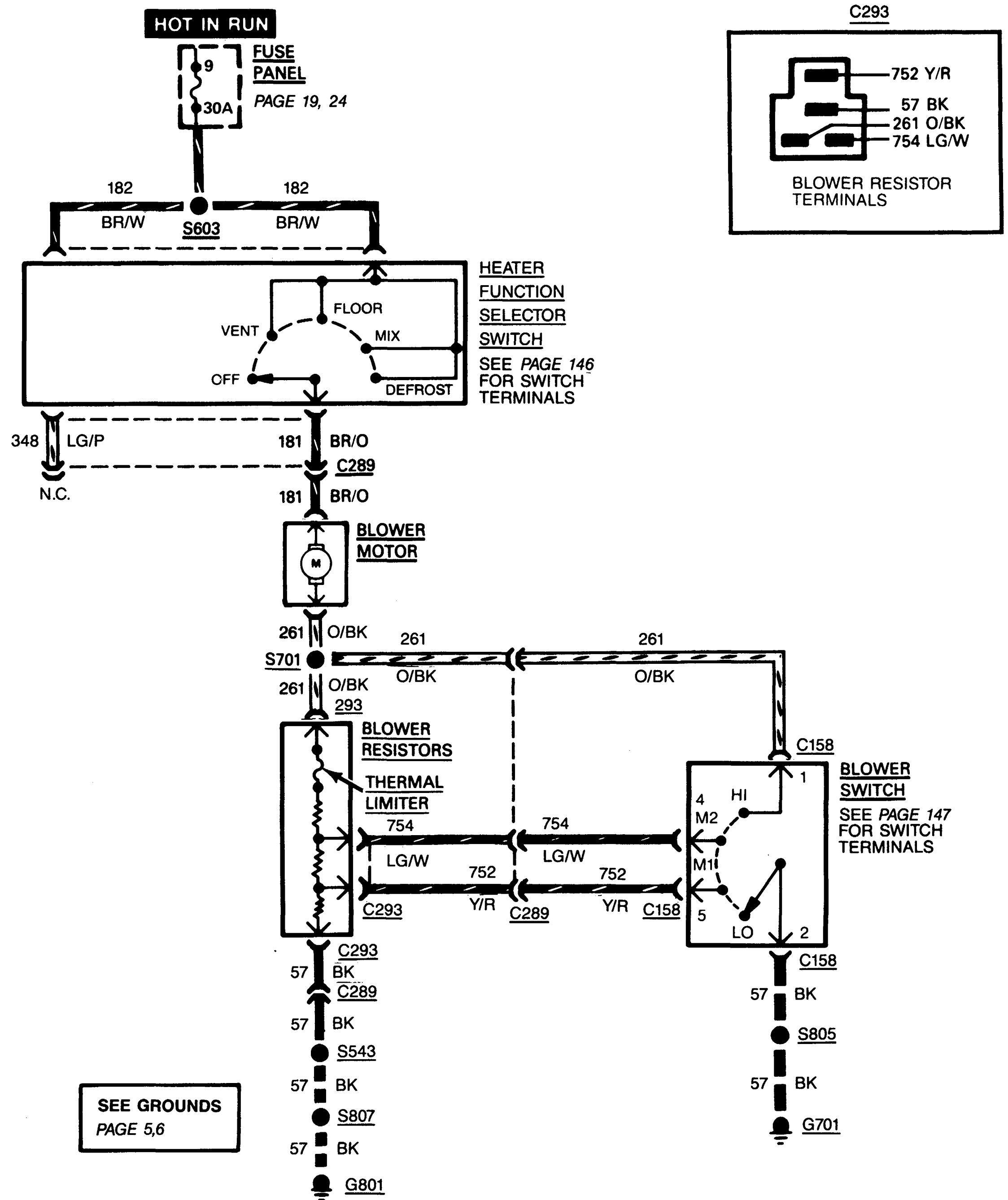


Figure 1 – Speed Control Servo

TER (ELECTRICAL)



HOW THE CIRCUIT WORKS

With the **Ignition Switch** in RUN, the **Heater Function Selector Switch** in a position other than OFF, and the **Blower Switch** in LO, MED 1, MED 2, or HI, voltage is applied through **Fuse 9,** the **Blower Motor,** the **Blower Resistors** and the **Blower Switch** to **G701.**

In LO, MED 1, or MED 2, voltage is applied through one, two or all **Blower Resistors.** In HI, voltage is applied directly from the **Blower Motor** through the switch to ground.

Refer to section 36-01 of the shop manual.

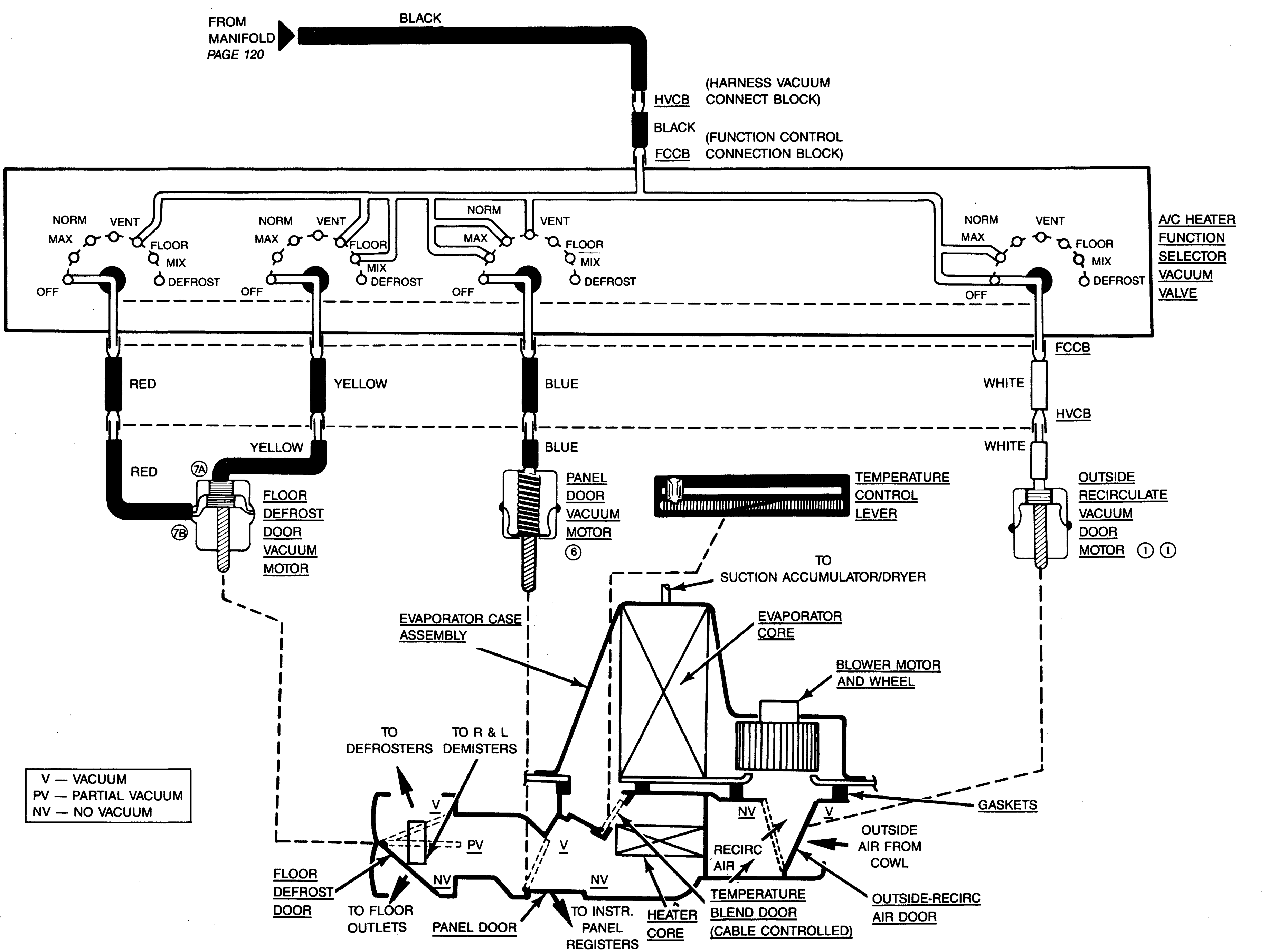
COMPONENT LOCATION

Component	Location	Page-Figure
Blower Motor	Mounted to heater housing at RH side of dash panel in engine compartment	—
Blower Resistors	Mounted to heater housing next to blower motor in engine compartment	131-1
Blower Switch	At center of I/P	—
Refer to Component Testing Page 147 for additional testing details.		
Heater Function Selector Switch	At center of I/P	—
Refer to Component Testing Page 146 for additional testing details.		

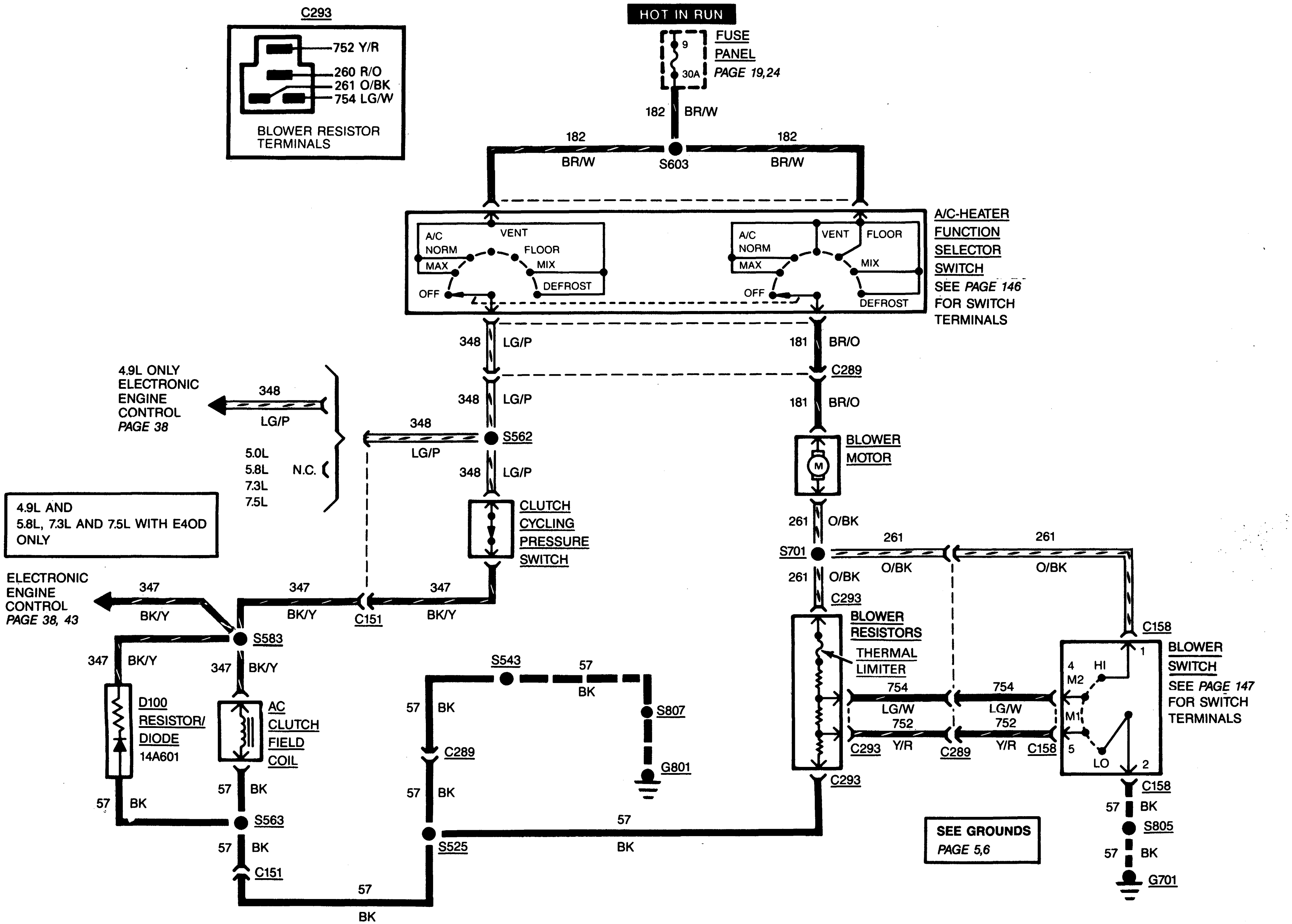
Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Blower does not work	• No voltage at Blower Motor	• Check Fuse 9 and wiring
	• Malfunctioning Heater Function Selector Switch	• Check continuity through switch. If poor continuity, replace switch
	• Poor continuity to ground from BK wire	• Clean/Tighten connection and check wiring for opens
	• Malfunctioning Blower Motor	• Replace with known good motor
	• Open Blower Resistors	• Replace as required
	• Malfunctioning Blower Switch	• Replace with known good switch



FROM MANIFOLD
PAGE 120
BLACK
HVCB
(HARNESS VACUUM CONNECT BLOCK)
BLACK
FCCB
(FUNCTION CONTROL CONNECTION BLOCK)
NORM
VENT
MAX
FLOOR
MIX
DEFROST
OFF
A/C HEATER FUNCTION SELECTOR VACUUM VALVE
FCCB
RED
YELLOW
BLUE
WHITE
HVCB
FLOOR DEFROST DOOR VACUUM MOTOR
7A
7B
PANEL DOOR VACUUM MOTOR
6
TEMPERATURE CONTROL LEVER
OUTSIDE RECIRCULATE VACUUM DOOR MOTOR
1 1
TO SUCTION ACCUMULATOR/DRYER
EVAPORATOR CASE ASSEMBLY
EVAPORATOR CORE
BLOWER MOTOR AND WHEEL
TO DEFROSTERS
TO R & L DEMISTERS
V — VACUUM
PV — PARTIAL VACUUM
NV — NO VACUUM
V
PV
NV
GASKETS
OUTSIDE AIR FROM COWL
RECIRC AIR
FLOOR DEFROST DOOR
TO FLOOR OUTLETS
PANEL DOOR
TO INSTR. PANEL REGISTERS
HEATER CORE
TEMPERATURE BLEND DOOR (CABLE CONTROLLED)
OUTSIDE-RECIRC AIR DOOR


C293
752 Y/R
260 R/O
261 O/BK
754 LG/W
BLOWER RESISTOR TERMINALS
HOT IN RUN
FUSE PANEL PAGE 19,24
9
30A
182 BR/W
182 BR/W
S603
182 BR/W
A/C-HEATER FUNCTION SELECTOR SWITCH
SEE PAGE 146 FOR SWITCH TERMINALS
A/C NORM
VENT
FLOOR
MAX
MIX
OFF
DEFROST
348 LG/P
181 BR/O
C289
4.9L ONLY ELECTRONIC ENGINE CONTROL PAGE 38
348 LG/P
S562
5.0L 5.8L 7.3L 7.5L N.C.
BLOWER MOTOR
CLUTCH CYCLING PRESSURE SWITCH
4.9L AND 5.8L, 7.3L AND 7.5L WITH E4OD ONLY
261 O/BK
S701
ELECTRONIC ENGINE CONTROL PAGE 38, 43
347 BK/Y
C151
S583
C293
BLOWER RESISTORS
THERMAL LIMITER
C158
BLOWER SWITCH
SEE PAGE 147 FOR SWITCH TERMINALS
HI
M2
M1
LO
D100 RESISTOR/ DIODE 14A601
AC CLUTCH FIELD COIL
S543
57 BK
S807
G801
754 LG/W
752 Y/R
S563
S525
SEE GROUNDS PAGE 5,6
S805
G701

HOW THE CIRCUIT WORKS

The A/C-Heater System is controlled by an **A/C-Heater Function Selector Switch** and **Vacuum Valve,** a **Temperature Control Lever Assembly** and a **Blower Switch** located in the instrument panel assembly. The system is also comprised of a **Blower Motor** and housing assembly, a plenum assembly and air distribution ducts, an evaporator assembly and a condenser and compressor.

The **Function Selector Switch** and **Vacuum Valve** operate together to control system vacuum and electrical operation. **Vacuum Motors** operate the various air control doors to direct air flow. The **Function Selector Switch** also applies voltage to the **Blower Motor** and **A/C Clutch Field Coil** circuits. The **Blower Motor** is designed for the ground side switching method of controlling blower operation.

The **Temperature Control Lever** moves a control cable connected to the **Temperature Blend Door** which directs air through or around the **Heater Core.**

The A/C-Heater System also contains a **Clutch Cycling Pressure Switch.** This Switch controls the cycling of the **A/C Clutch Field Coil** to prevent the evaporator from freezing and blocking air flow.

Lever Position and Operation

OFF - Vacuum is applied to the **Outside-Recirculate Door Vacuum Motor,** closing that door to outside air. The **Panel Door** closes the instrument panel outlets. The **Floor-Defrost Door** opens the defroster outlets. The **Blower** does not operate and no air passes through the system.

A/C MAX - The **Outside-Recirculate Door** closes to outside air. The **Panel Door** sends air to the instrument panel outlets (vacuum on motor). With the **Temperature Control Lever** in Cool position, the **Temperature Blend Door** prevents air flow through the **Heater Core.**

A/C NORM - Outside air comes through the **Outside-Recirculate Door.** The **Panel Door** sends air to the instrument panel outlets (vacuum on motor). The **Temperature Blend Door** controls the air through the **Heater Core.**

VENT - Air flow is the same as in A/C NORM. The compressor is OFF.

FLOOR - Outside air is passed through or around the **Heater Core** as controlled by the **Temperature Control Lever.** The **Panel Door** is closed and air is sent to the floor outlets (vacuum at 7A and 7B of the **Floor-Defrost Door Vacuum Motor).** The compressor is OFF.

MIX - The **Outside-Recirculate Door** lets in outside air (no vacuum at motor). Vacuum is applied to port 7A of the **Floor-Defrost Door.** The door moves to mid position and air is split between the floor and defrost outlets. The **Panel Door** closes and the A/C compressor operates to dehumidify the air.

DEFROST - With no vacuum at any Vacuum Motor, air passes through the outlets. The compressor operates to dehumidify the air.

Refer to section 36-01 of the shop manual.

COMPONENT LOCATION

Component	Location	Page-Figure
A/C-Heater Function Selector Switch	In center of I/P	—
Refer to Component Testing Page 146 for additional testing details.		
A/C Clutch Field Coil	Part of Compressor	131-2
Blower Motor	Mounted to evaporator at RH side of dash panel in engine compartment	—
Blower Switch	At center of I/P	—
Refer to Component Testing Page 147 for additional testing details.		
Blower Resistors	Mounted to evaporator next to blower	131-1
Clutch Cycling Pressure Switch	RH side of dash panel on accumulator	—

Refer to the **Location Index** in the back of the manual for connector, ground, diode and splice descriptions and locations.

TROUBLESHOOTING HINTS

CONDITION	POSSIBLE CAUSE	ACTION
• Blower does not work	• No voltage at Blower Motor	• Check Fuse 9 and wiring
	• Malfunctioning A/C-Heater Function Selector Switch	• Check continuity through switch. If poor continuity, replace switch
	• Poor continuity to ground from BK wire of Blower Switch	• Clean/Tighten connection and check wiring for opens
	• Malfunctioning Blower Motor	• Replace with known good motor
	• Open Blower Resistors	• Replace as required
	• Malfunctioning Blower Switch	• Replace with known good switch
• Compressor Clutch does not work	• No voltage at BK/Y wire of A/C Clutch Field Coil with ON	• Check Fuse 9 and wiring
	• Open in A/C Clutch Field Coil	• Replace with known good coil
	• No continuity of BK wire of A/C Clutch Field Coil to ground	• Check for open in BK wire
	• Lack of R-12 refrigerant	• Recharge as required
• Hissing: No recirculating air	• Vacuum line leak	• Replace as required
	• Malfunctioning Vacuum Motor	• Replace with known good motor
• No cooling or not enough cooling	• Compressor Drive Belt is loose	• Tighten/Replace as required
	• Temperature Control Cable is out of adjustment	• Adjust as required

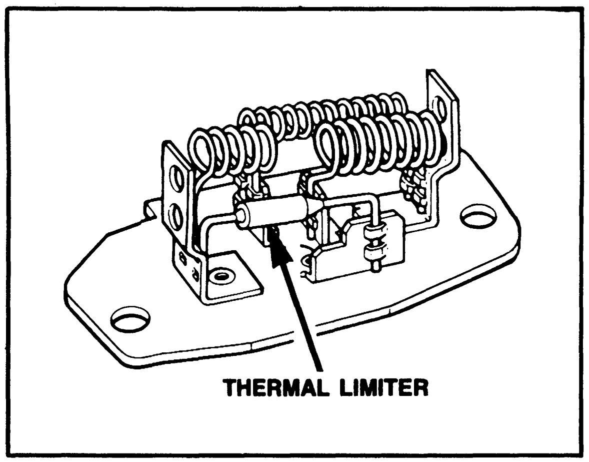


Figure 1 — Blower Resistor Assembly

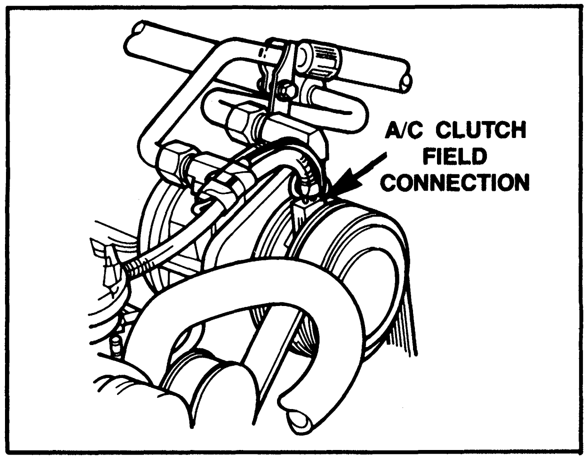


Figure 2 — Air Conditioning Compressor Field Coil

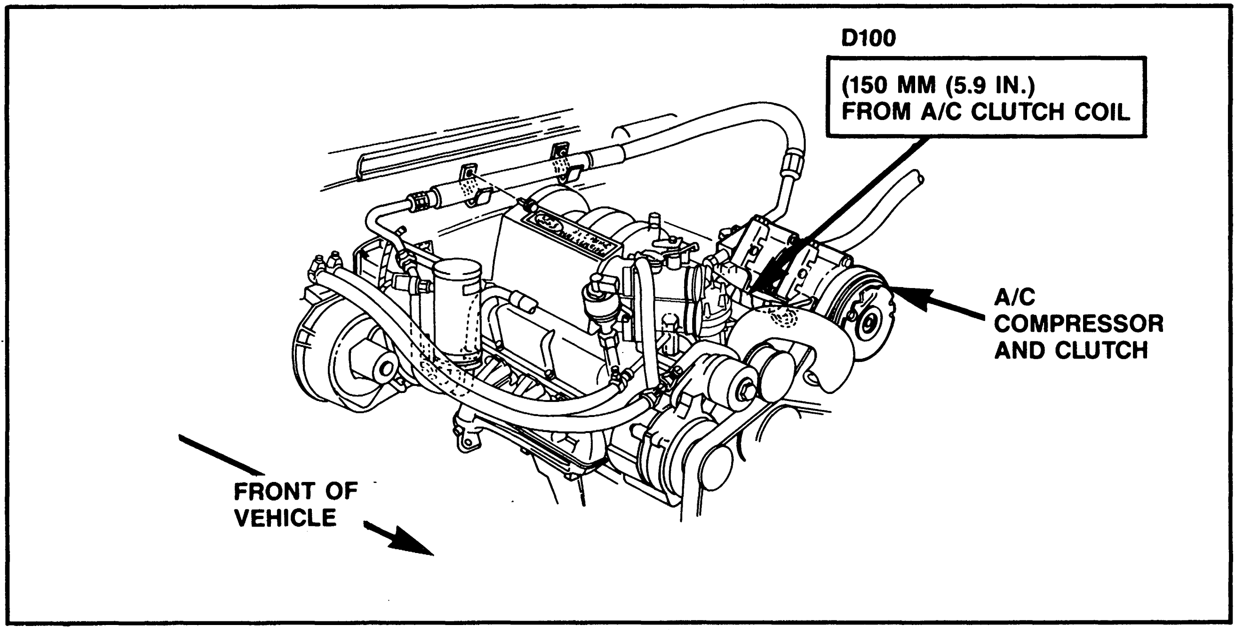


Figure 3 — 5.0L & 5.8L Engine

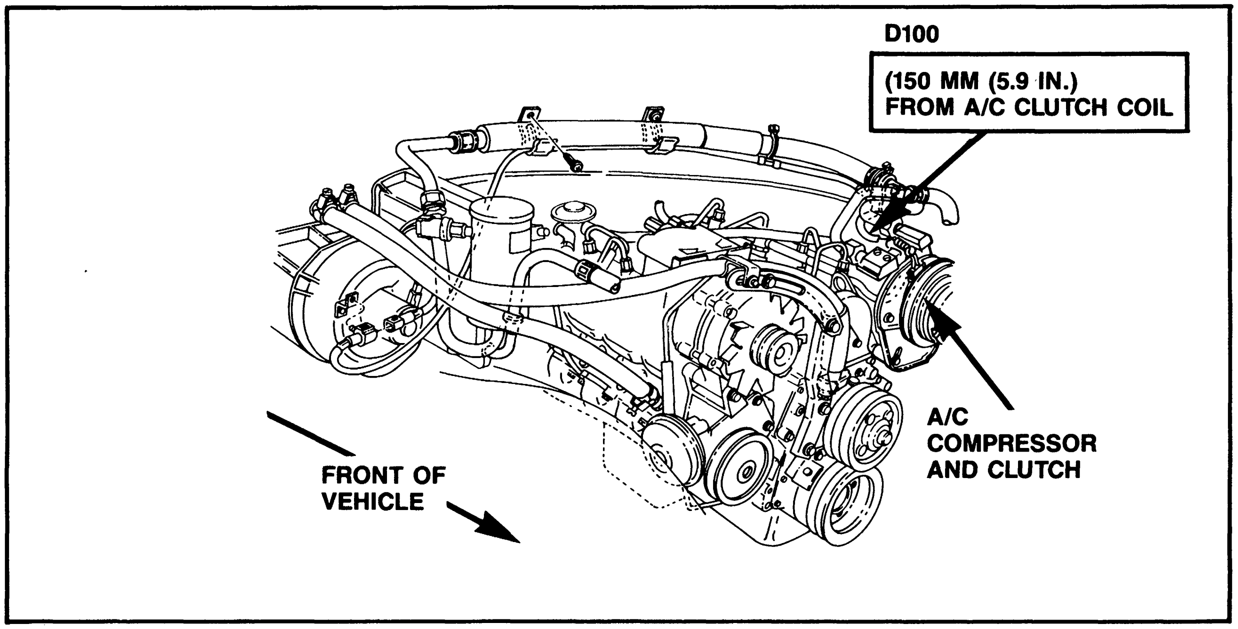


Figure 4 — 7.3L Diesel Engine

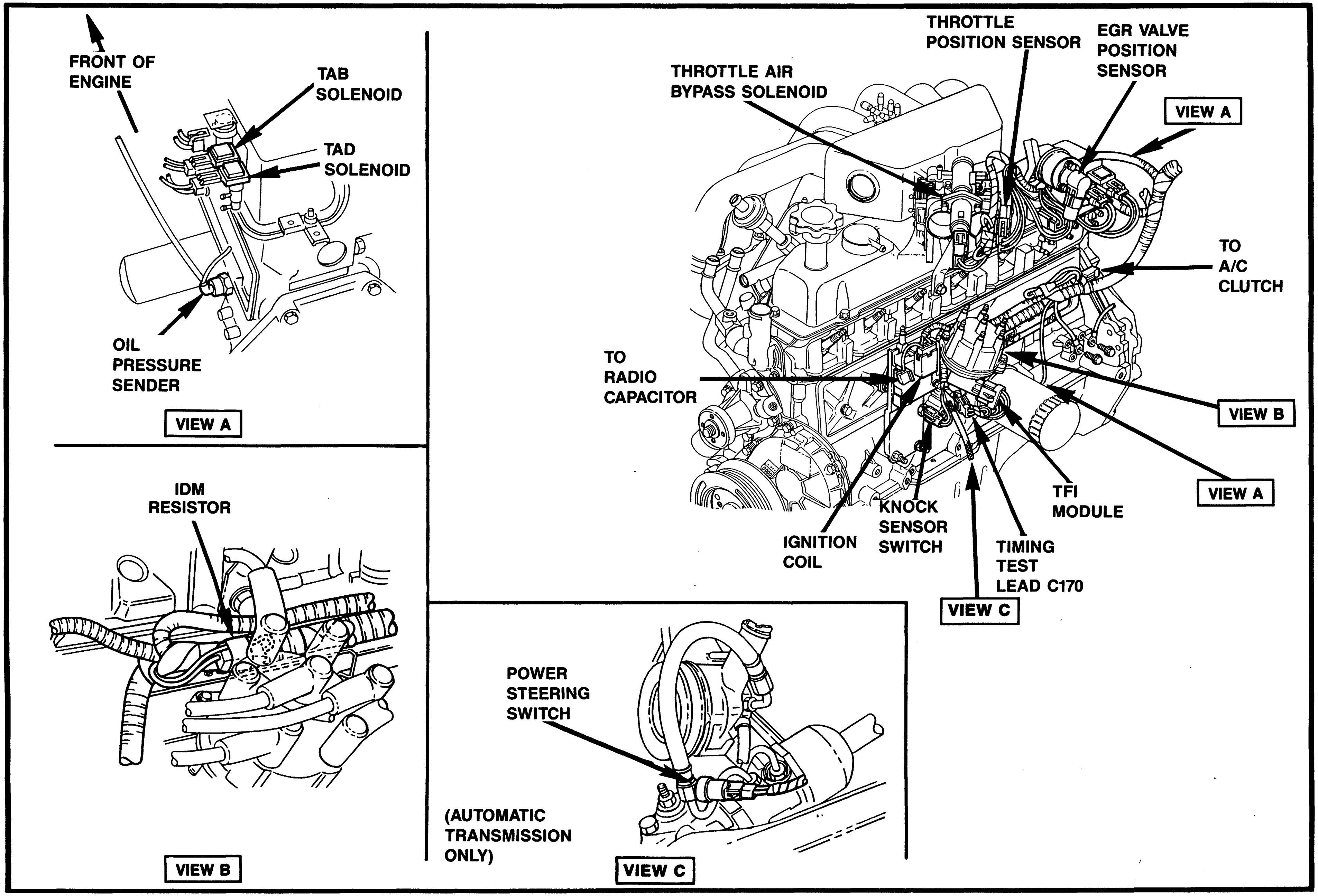


Figure 1 — LH View 4.9L EFI Engine

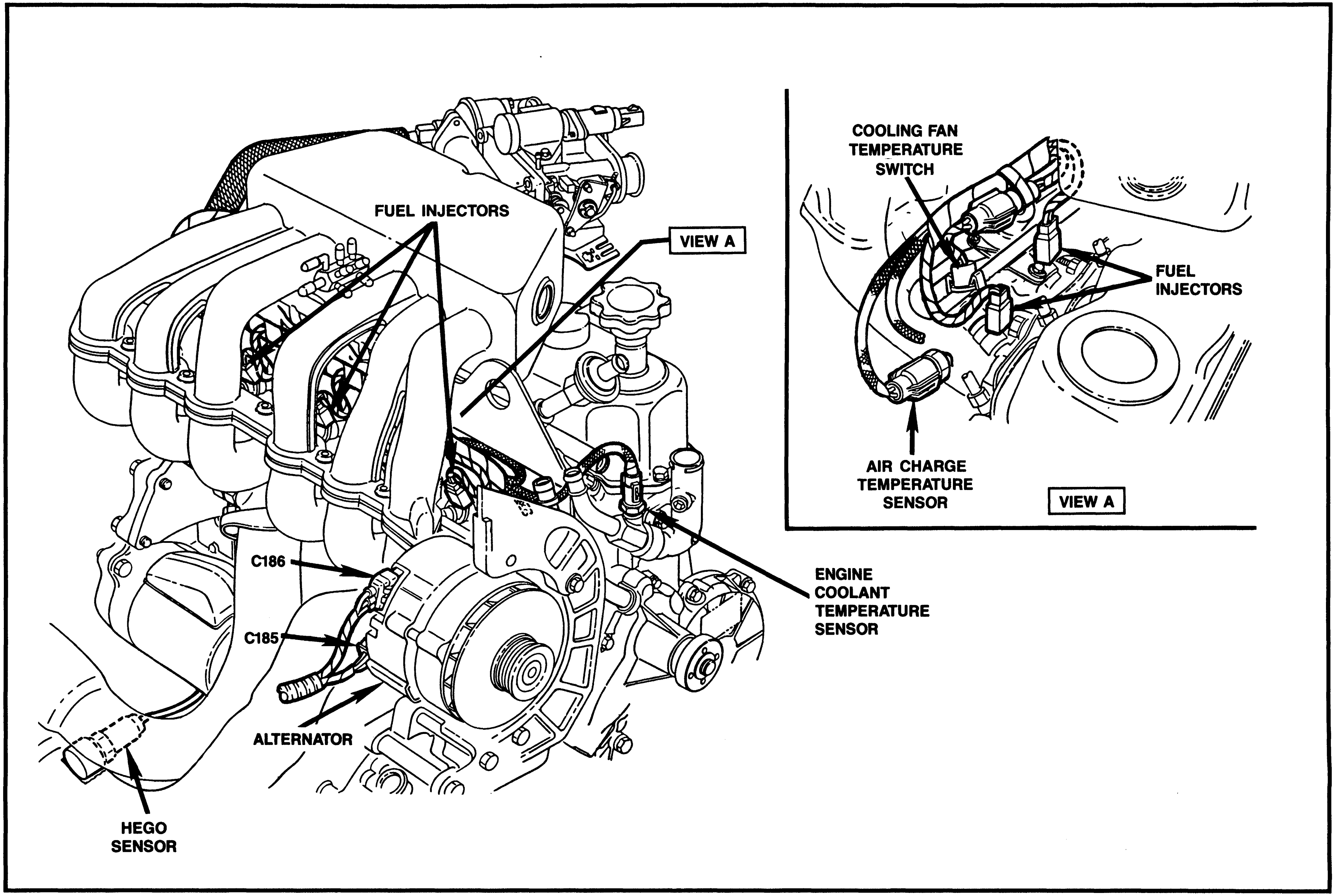


Figure 2 — RH View 4.9L EFI Engine

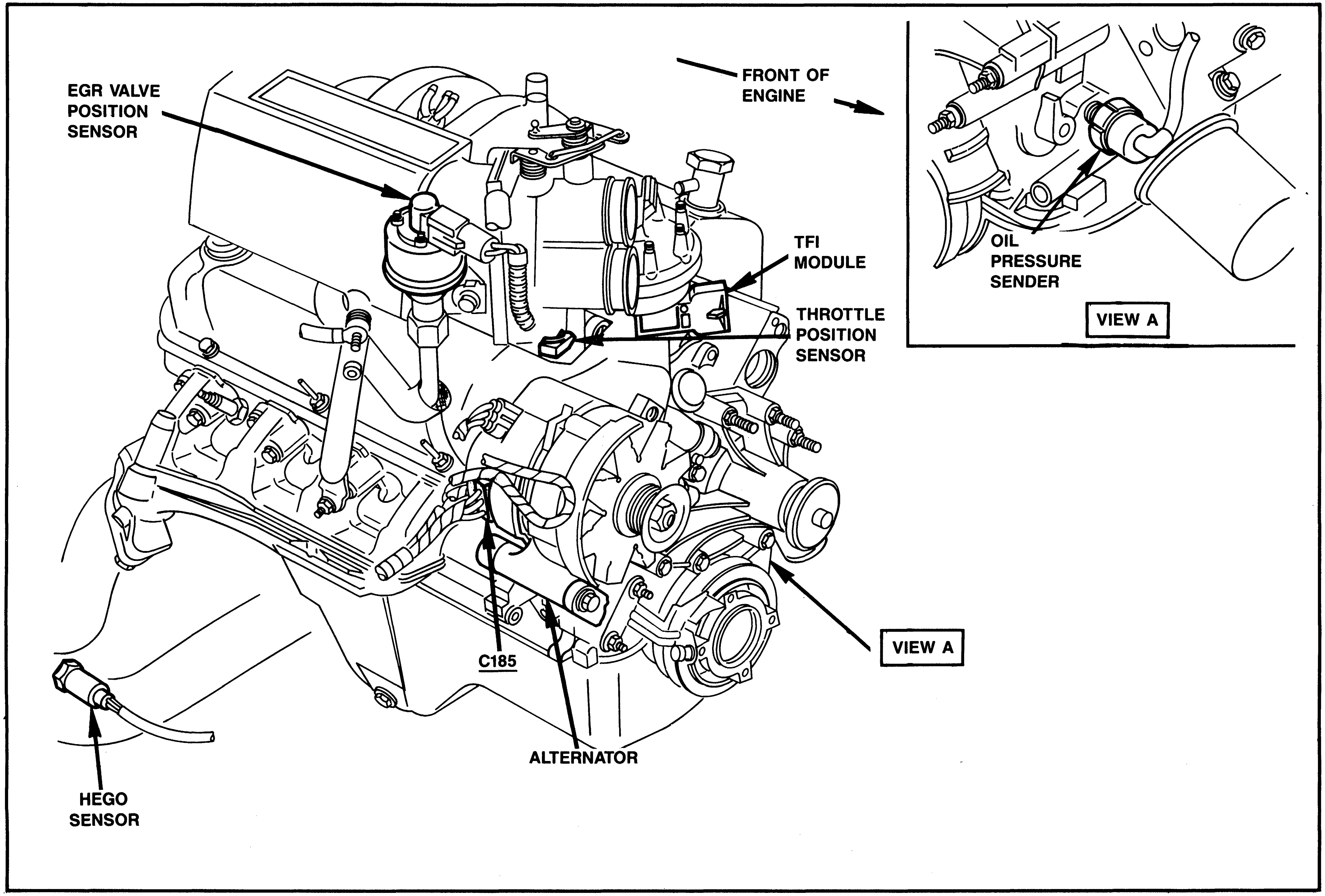


Figure 3 — RH View 5.0L Engine

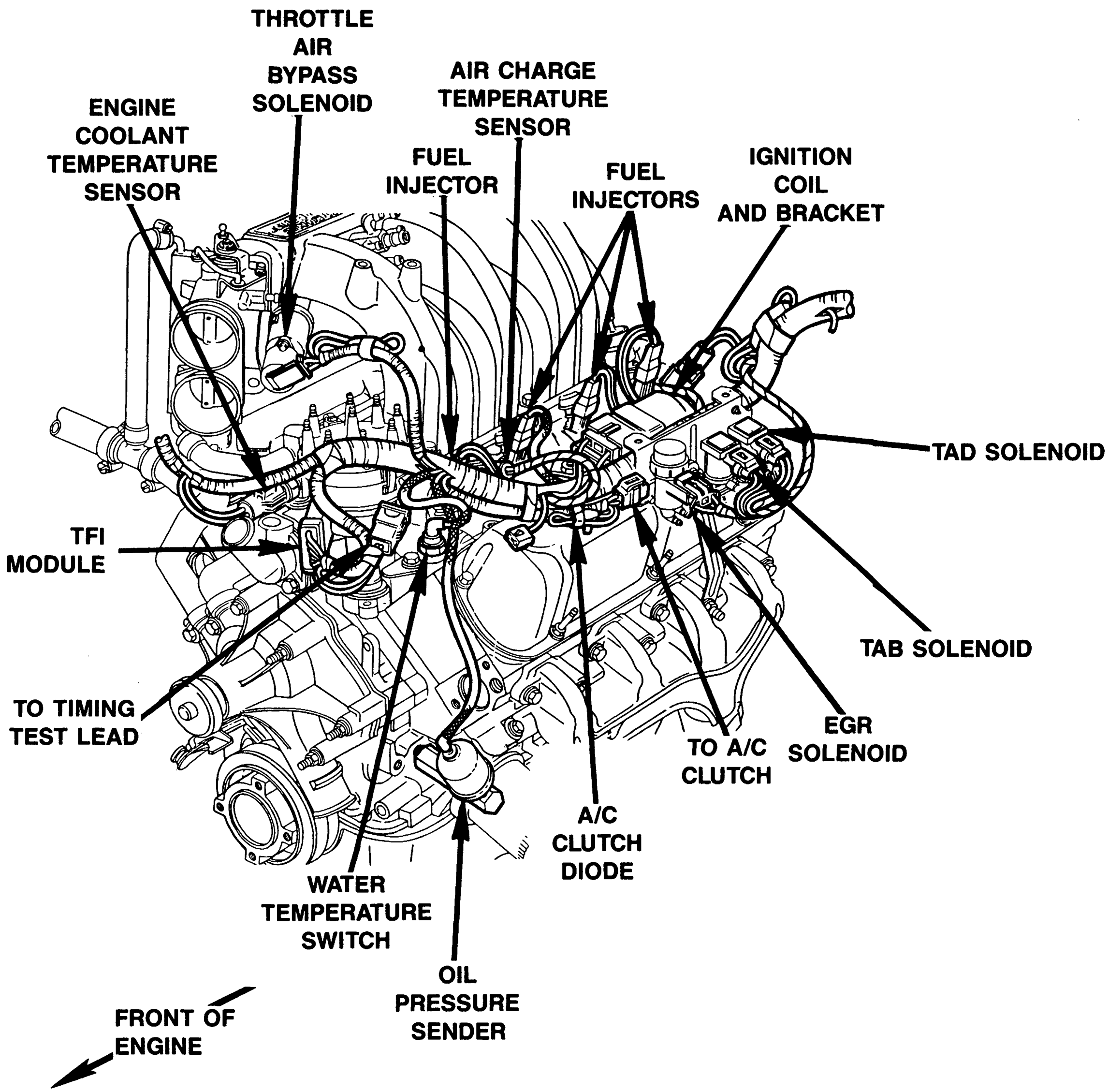


Figure 4 — LH View 5.0L & 5.8L Engine

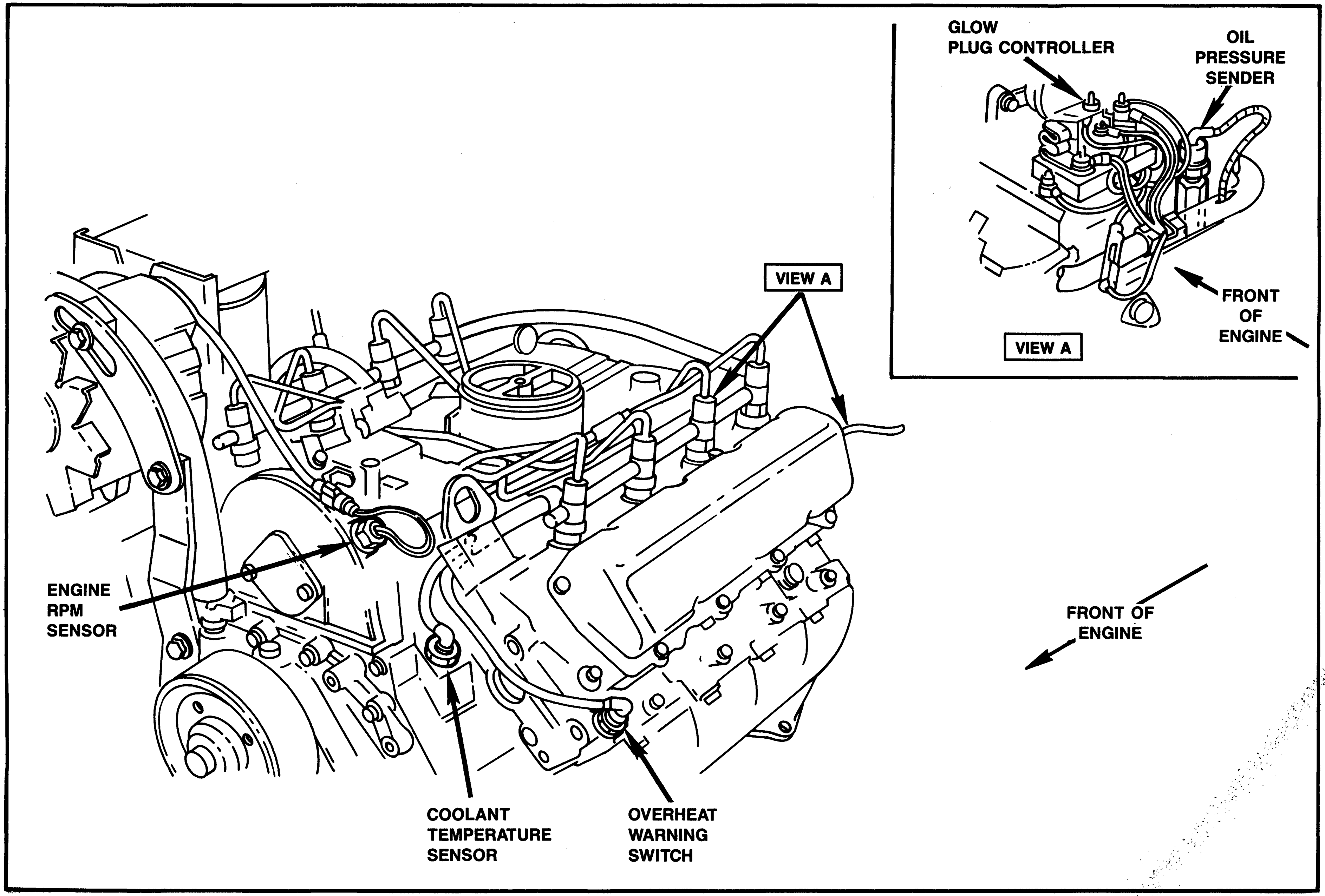


Figure 5 — LH View 7.3L with Manual Transmission

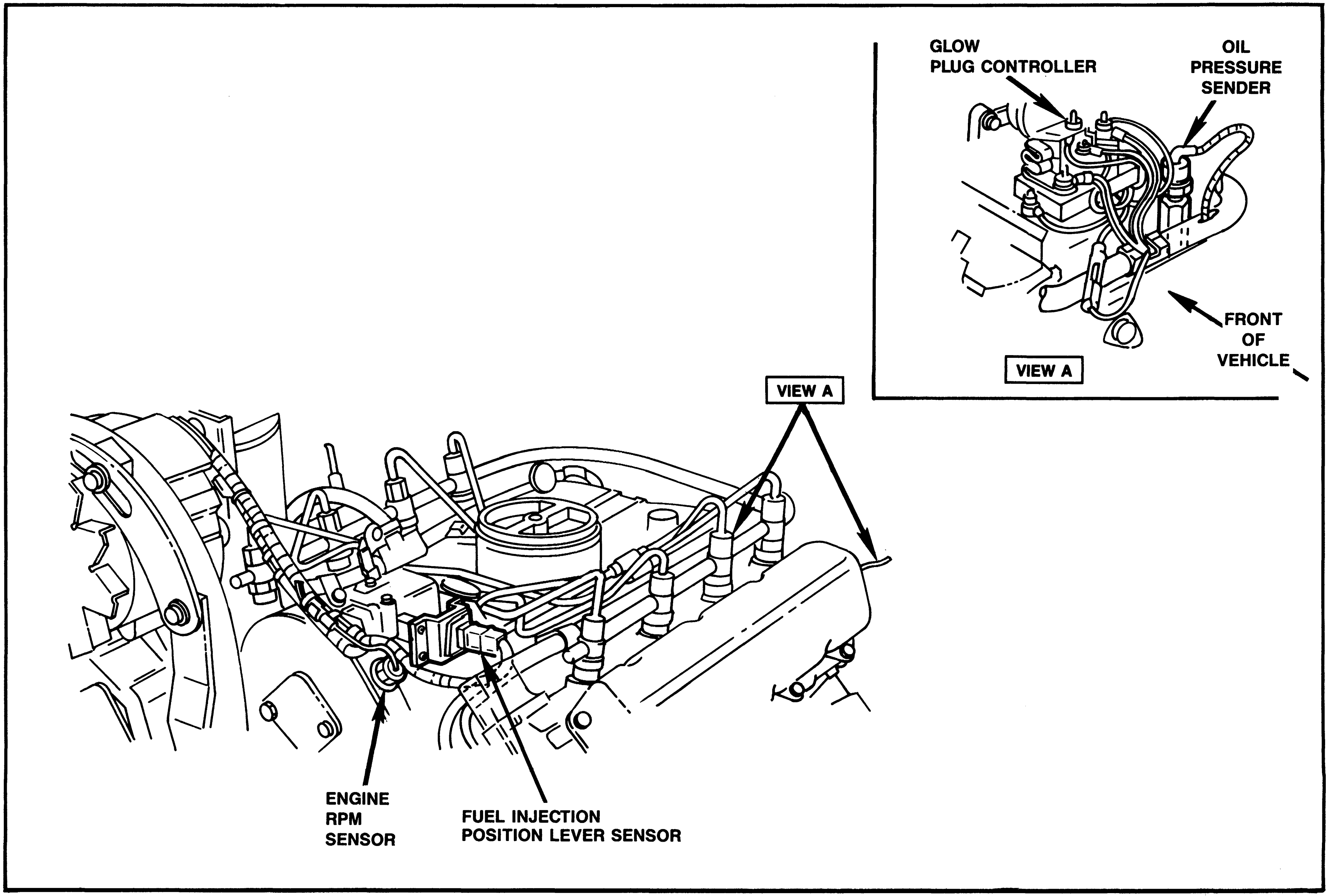


Figure 6 — LH View 7.3L with E40D Transmission

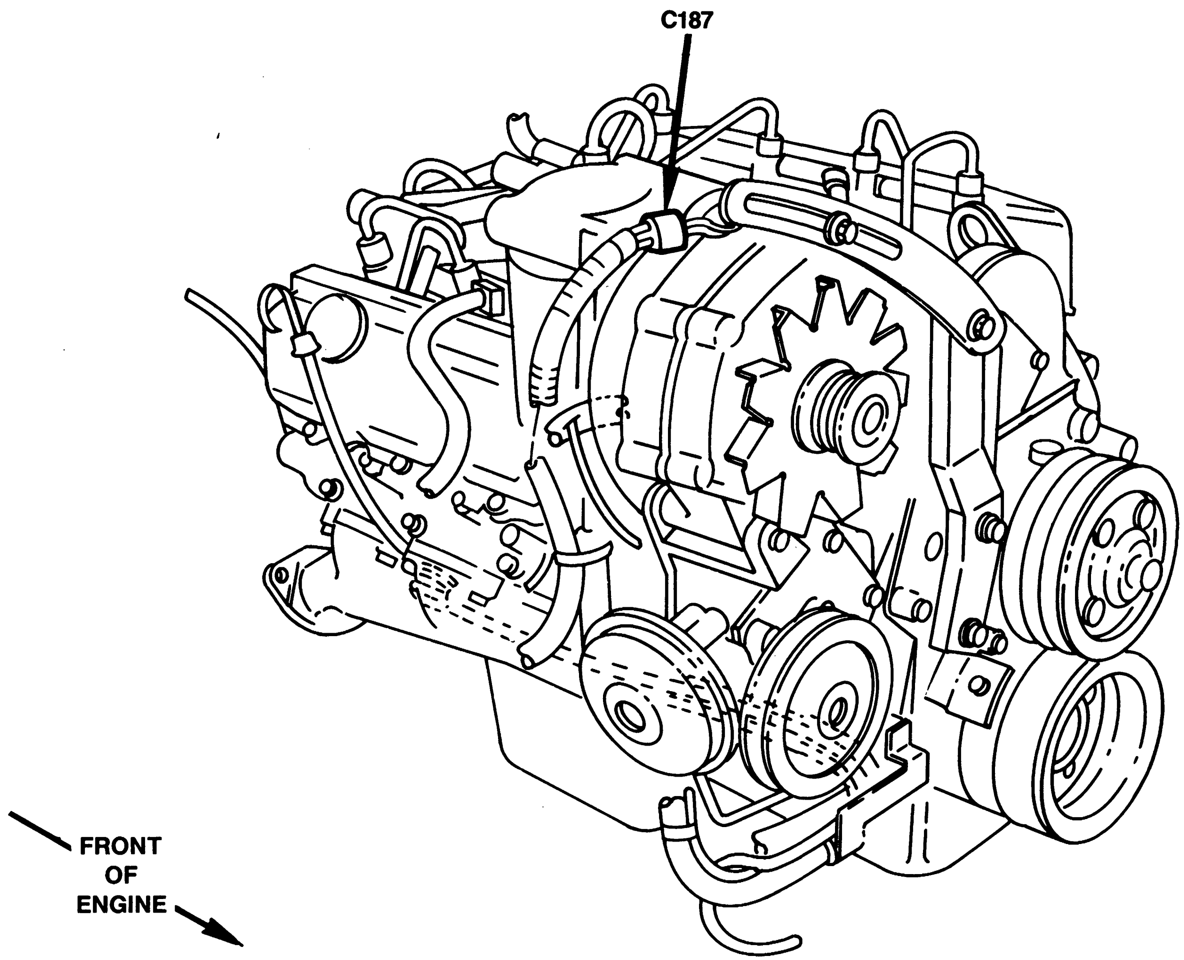


Figure 7 — RH View 7.3L Diesel

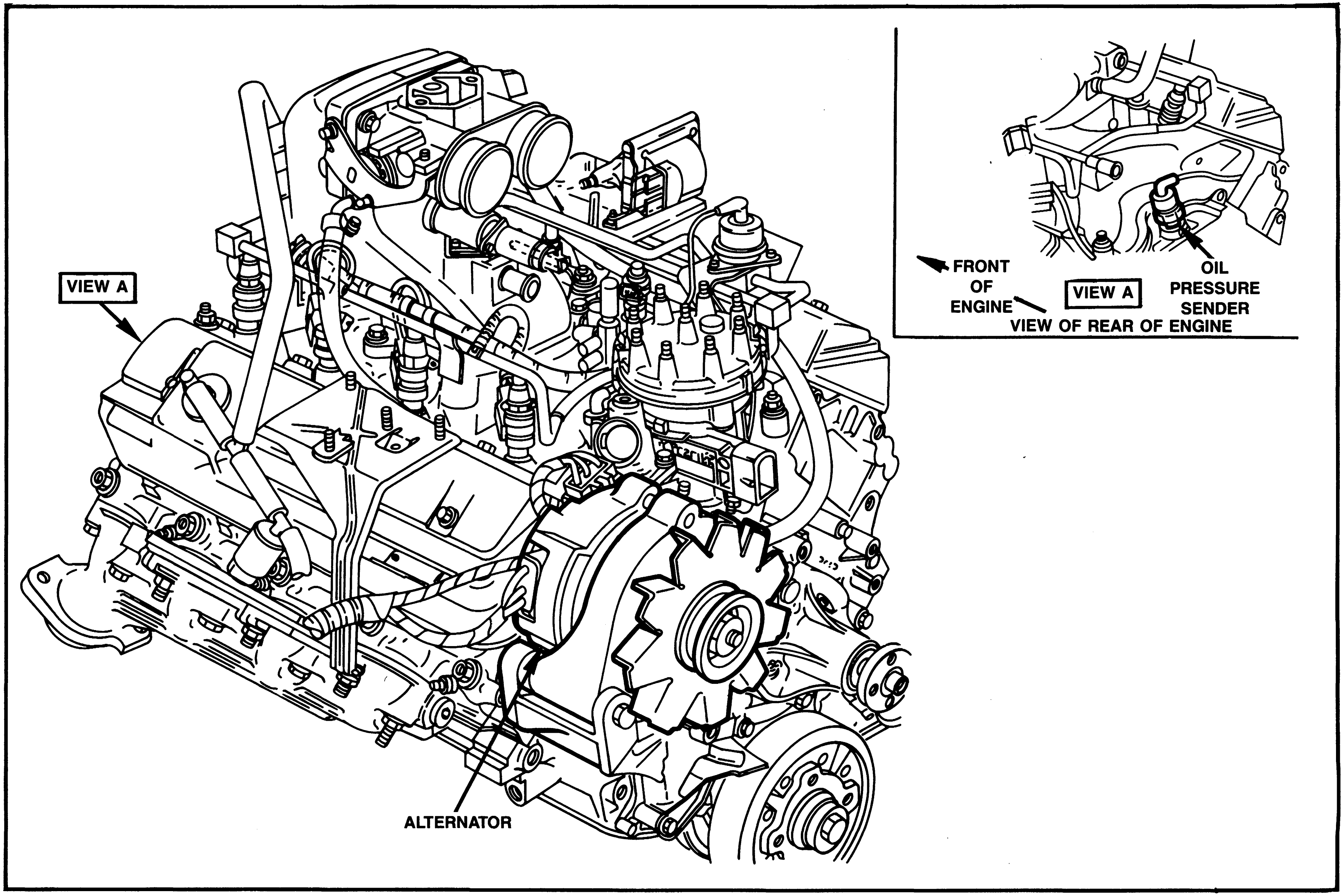


Figure 8 — RH View 7.5L Engine

INTRODUCTION

Component testing procedures are provided to prove that a component is good or bad.

Testing information for each component includes a schematic, component terminal locations and step-by-step test procedures. Component terminals are identified:

1) by the circuit number of the wires that connect to that terminal;
2) by the wire insulation color
3) by letters or numbers which may be marked on the component.

38 BK/O (B)

Circuit number as shown on schematics	Wire insulation color	Terminal, as marked on some components

The component connector MUST BE REMOVED before testing. To test a single circuit within the component, select that circuit under the column TO TEST. If you wish to test the complete component, perform all tests.

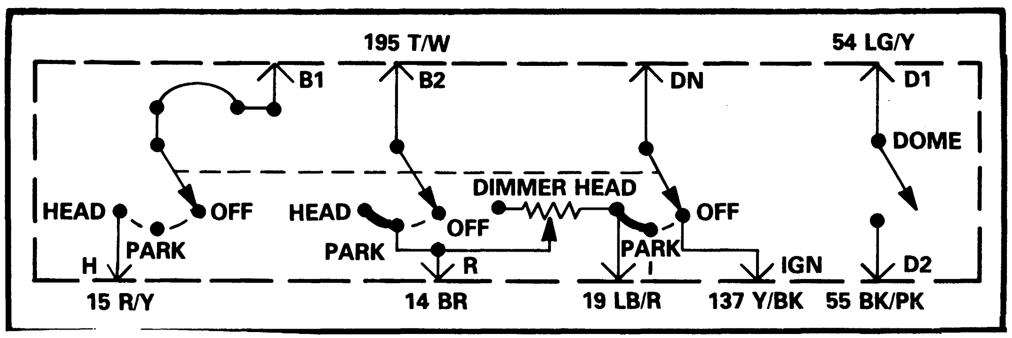
Connect the tester to the terminals shown in the second column and operate the component as shown in the third column.

MAIN LIGHT SWITCH

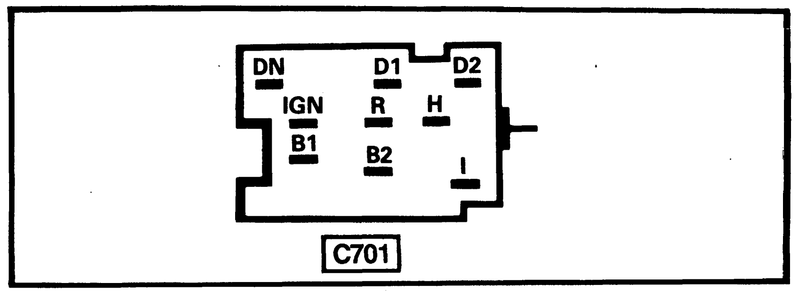
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Headlamp Circuit	38 BK/O (B) *and* 15 R/Y (H)	Off Park Head	Open Circuit Open Circuit Closed Circuit
Park Lamp Circuit	195 T/W (A) *and* 14 BR (R)	Off Park Head	Open Circuit Closed Circuit Closed Circuit
Dome Light Circuit	54 LG/Y (D1) *and* 55 BK/PK (D2)	Fully Counter-Clockwise (In Detent) Clockwise (Any Amount Out of Detent)	Closed Circuit Open Circuit
Panel Light Dimmer Circuit	14 BR (R) *and* 19 LB/R (I)	Rotate Knob Clockwise	Ohmmeter Will Indicate Increasing Resistance
Ignition On, Lamps Off Circuit	137 Y/BK (IGN) *and* 484 O/BK (DN)	Off Park Head	Closed Circuit Open Circuit Open Circuit
Cluster Dimmer Circuit	19 LB/R (I) and 484 O/BK (DN)	Off Park Head	Open Circuit Closed Circuit Closed Circuit

SCHEMATIC



TERMINAL LOCATIONS ON SWITCH



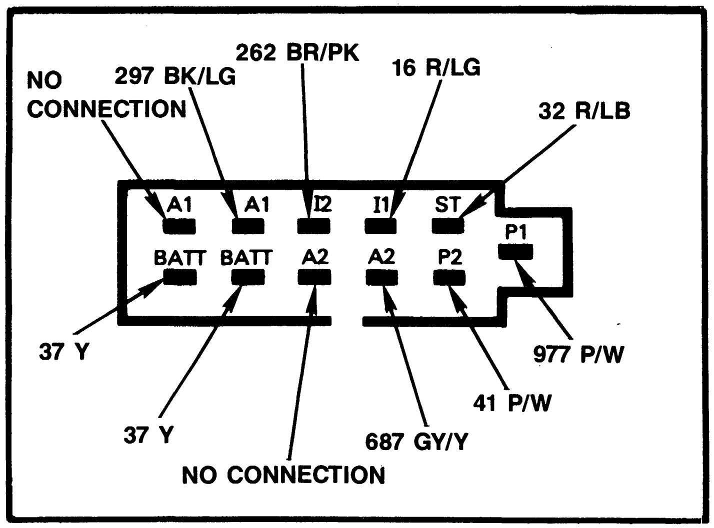
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Internal Switch Connections (perform these tests first)	37 Y (BATT) *and* 37 Y (BATT)	Accy, Lock, Off, Run, Start	Closed Circuit in all five positions
Starter Relay Circuit	37 Y (BATT) (either terminal) *and* 32 R/L B (ST)	Accy, Lock, Off, Run, Start	Closed Circuit in **Start** position only
A/C, Heater Circuit, Turn/ Stoplamps, Backup Lamps	37 Y (BATT) (either terminal) *and* 687 GY/Y (A2) (either terminal)	Accy, Lock, Off, Run, Start	Closed Circuit in **Run** position only

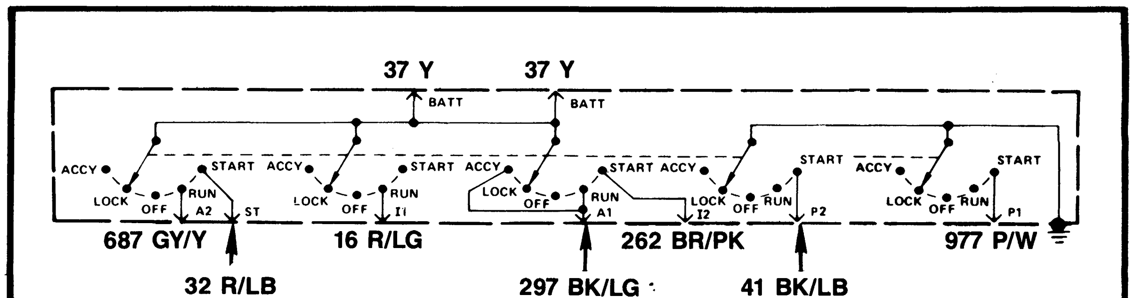
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Ignition Circuit	37 Y (BATT) (either terminal) *and* 16 R/LG	Accy, Lock, Off, Run, Start	Closed Circuit in **Run**.
	37 Y (BATT) (either terminal) *and* 262 BR/PK (I2)	Accy, Lock, Off, Run, Start	Closed Circuit in **Start** position only
"Accy" Circuit	37 Y (BATT) (either terminal) *and* 297 BK/LG (A1)	Accy, Lock, Off, Run, Start	Closed Circuit in **Run** and **Accy** position only
Bulb-Test Circuit	41 BK/LB (P2) *and* Ignition Switch Case	Accy, Lock, Off, Run, Start	Closed Circuit in **Start** position only
	977 P/W (P1) *and* Ignition Switch Case	Accy, Lock, Off, Run, Start	Closed Circuit in **Start** position only

TERMINAL LOCATIONS



SCHEMATIC



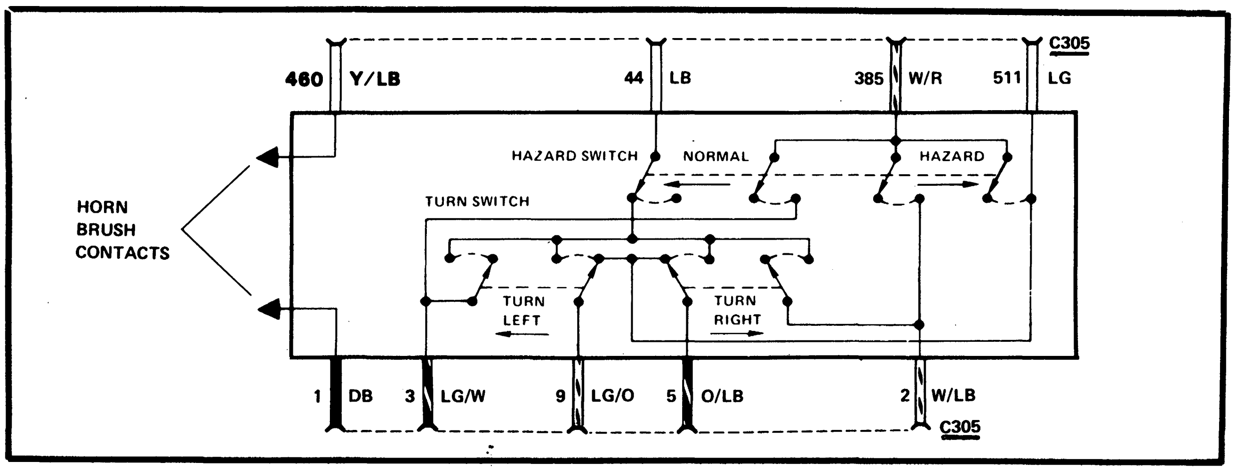
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Horn Switch Circuit	460 Y/LB *and* 1 DB	Depress Horn Switch (If removed from truck, jumper brush contacts)	Closed Circuit
LH Rear Turn Circuit	44 LB *and* 9 LG/O	Turn Switch to Turn Left and Hazard Switch to Normal	Closed Circuit
LH Front Turn Circuit	44 LB *and* 3 LG/W	Turn Left	Closed Circuit
RH Rear Turn Circuit	44 LB *and* 5 O/LB	Turn Right	Closed Circuit
RH Front Turn Circuit	44 LB *and* 2 W/LB	Turn Right	Closed Circuit

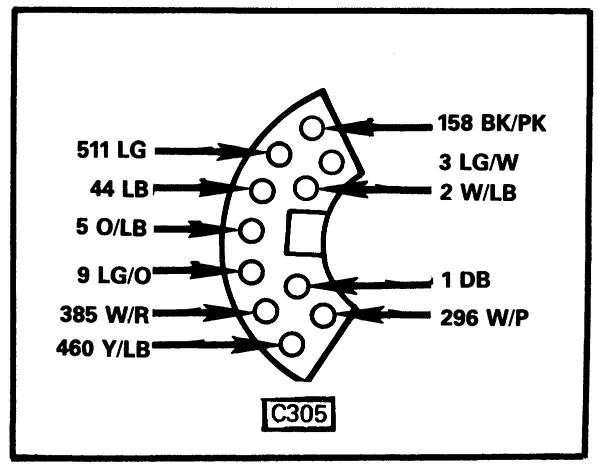
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Hazard Switch Circuit	385 W/R *and* 511 LG	Hazard	Closed Circuit
	385 W/R *and* 2 W/LB	Hazard	Closed Circuit
	385 W/R *and* 3 LG/W	Hazard	Closed Circuit
Stoplamp Feed-Through Circuit	511 LG *and* 9 LG/O	Turn Switch to center (No Turn) position or Turn Right	Closed Circuit
	511 LG *and* 5 O/LB	Turn Switch to center (No Turn) position or Turn Left	Closed Circuit

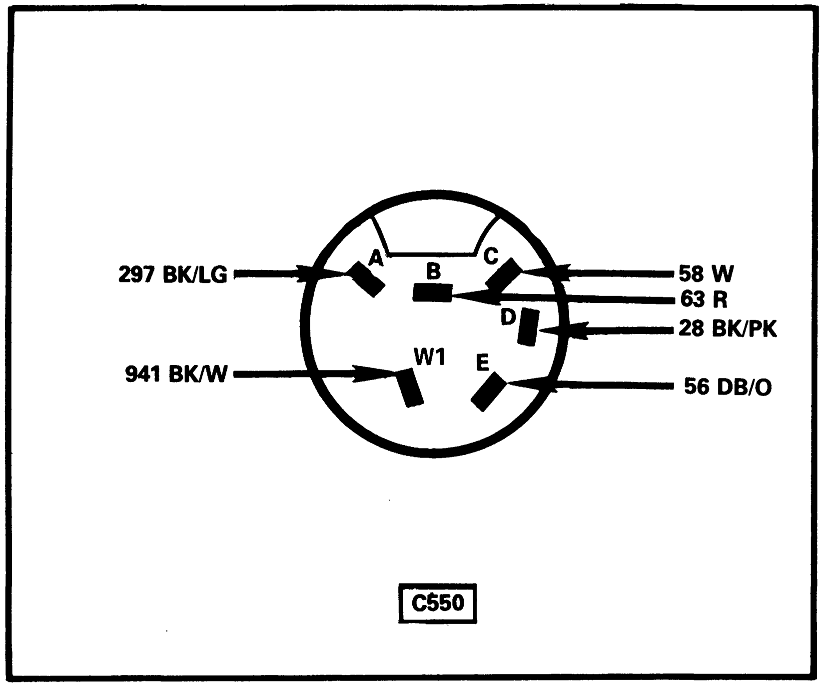
SCHEMATIC



TERMINAL LOCATIONS



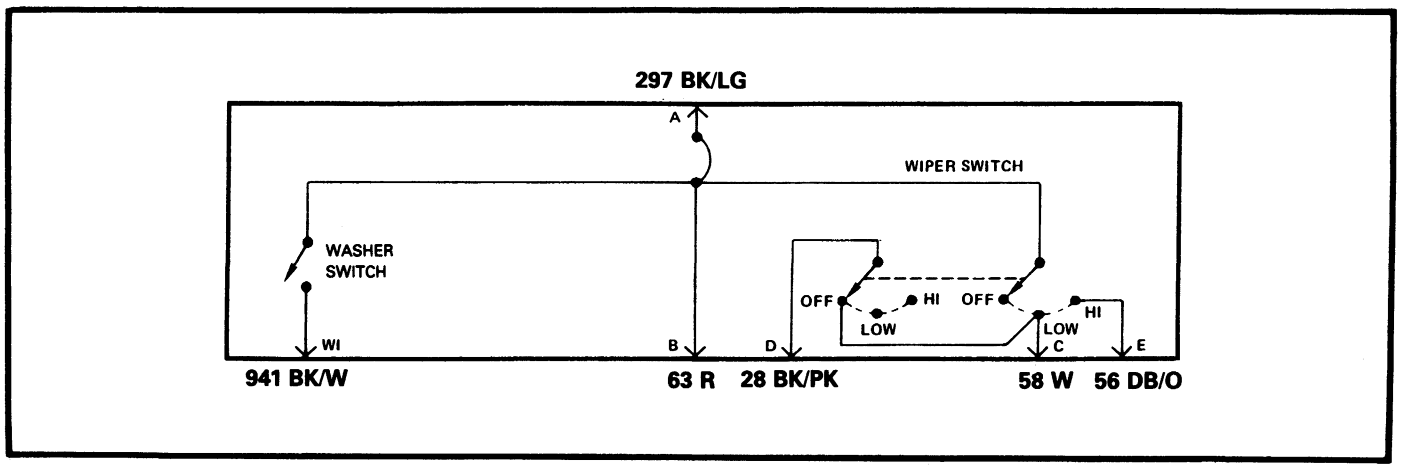
TERMINAL LOCATIONS ON SWITCH



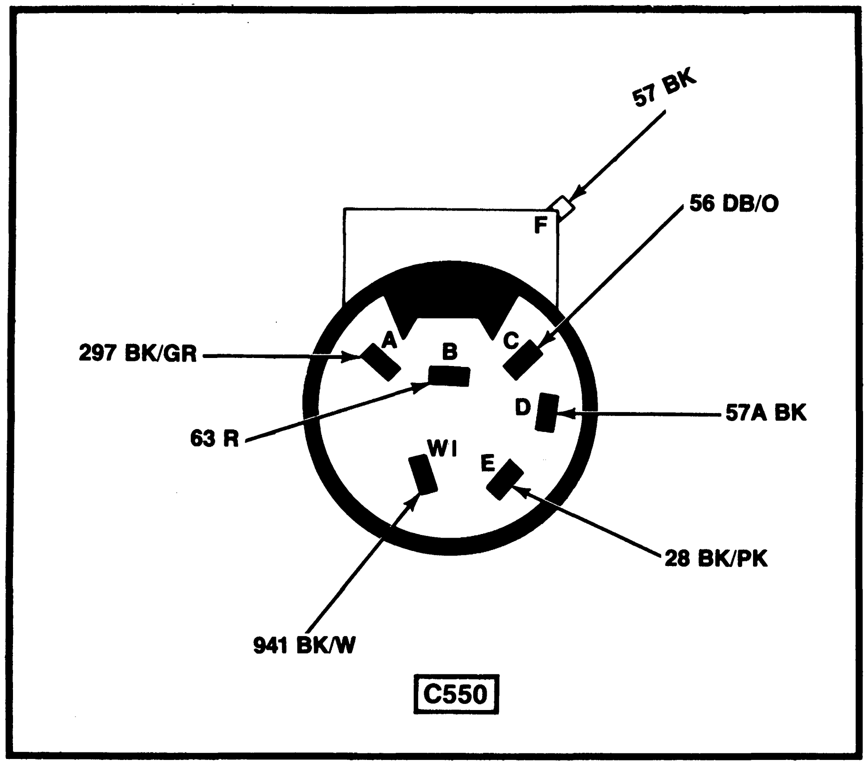
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Washer Switch Circuit	941 BK/W (W1) *and* 63 R (B)	Push knob Release knob	Closed Circuit Open Circuit
Wiper Switch Circuit	63 R (B) *and* 58 W (C)	**Off** **Lo** **Hi**	Open Circuit Closed Circuit Open Circuit
	63 R (B) *and* 56 DB/O (E)	**Off** **Lo** **Hi**	Open Circuit Open Circuit Closed Circuit
	58 W (C) *and* 28 BK/PK (D)	**Off** **Lo** **Hi**	Closed Circuit Open Circuit Open Circuit
Circuit Breaker	297 BK/LG (A) *and* 63 R (B)	All positions	Closed Circuit

SCHEMATIC



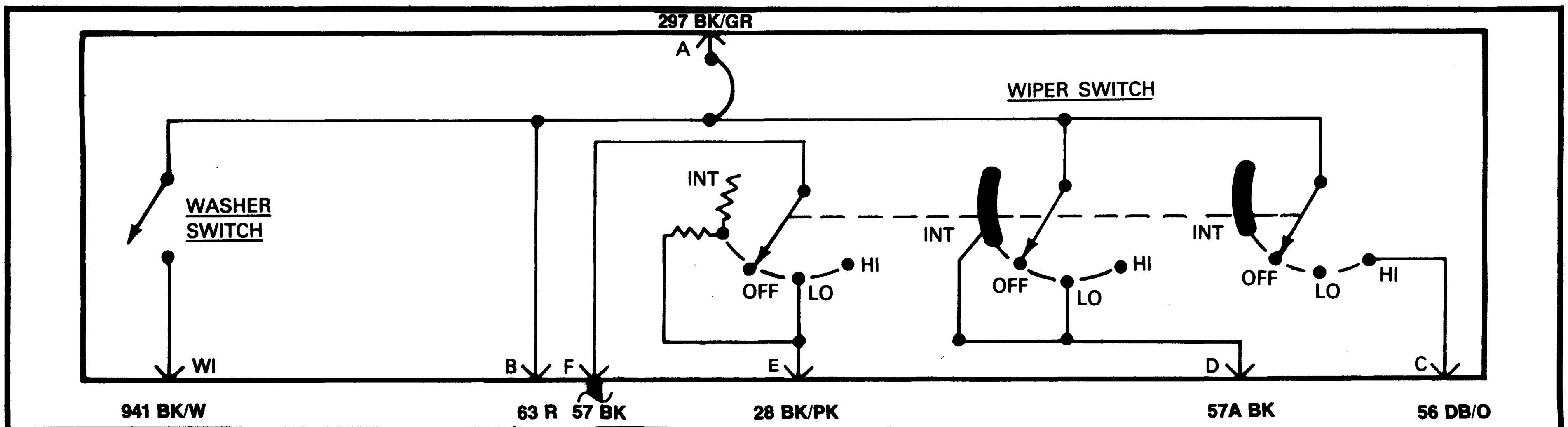
TERMINAL LOCATIONS ON SWITCH



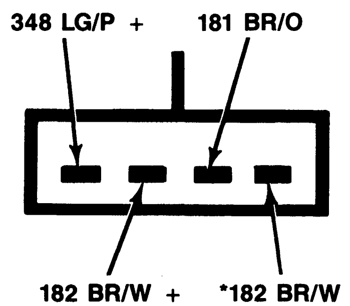
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Wiper Switch Circuit	57 BK (F) *and* 57A BK (D)	Off	Open Circuit
		All other positions	Closed Circuit
	63 R (B) *and* 56 DB/O (C)	Hi	Closed Circuit
		All other positions	Open Circuit
	28 BK/PK (E) *and* 57 BK (F)	Off	Open Circuit
		Rotate Control Clockwise Into Position (as Viewed from Connector Side).	Ohmmeter will indicate smoothly increasing resistance from 200-1000 ohms minimum to 5600-8400 ohms maximum
		All other positions	Closed Circuit

SCHEMATIC



TERMINAL LOCATIONS



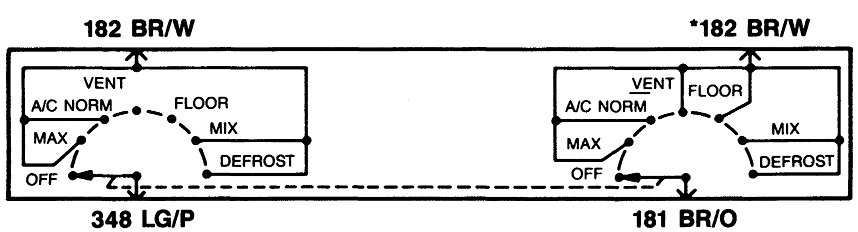
\+ NOT USED WITH HEATER ONLY

COMPONENT TESTING PROCEDURE

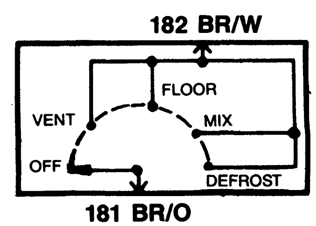
TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
A/C Clutch Circuit	182 BR/W *and* 348 LG/P	Off	Open Circuit
		A/C Max	Closed Circuit
		A/C Norm	Closed Circuit
		Vent	Open Circuit
		Floor	Open Circuit
		Mix	Closed Circuit
		Defrost	Closed Circuit
Blower Motor Circuit	*182 BR/W *and* 181 BR/O	Off	Open Circuit
		All other positons	Closed Circuit

NOTE: HEATER ONLY USES BLOWER MOTOR CIRCUIT ONLY.

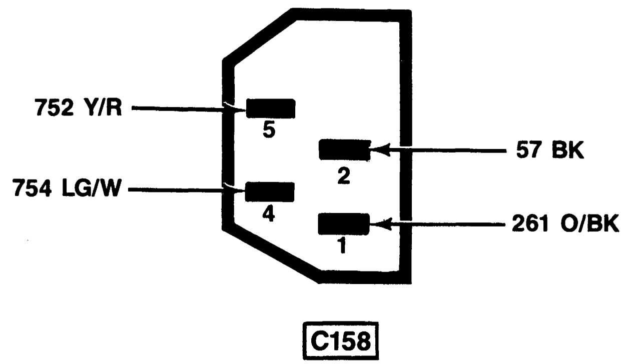
SCHEMATIC A/C HEATER



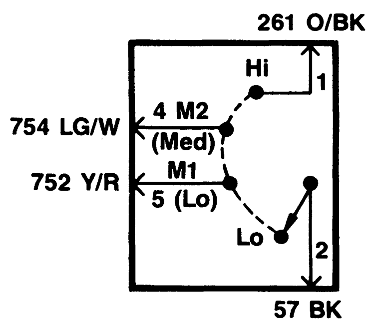
SCHEMATIC - HEATER ONLY



TERMINAL LOCATIONS



SCHEMATIC



COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
LO	57 BK (2)	Lo	Open Circuit
Medium-Low Speed (M1)	57 BK (2) *and* 752 Y/R (5)	Lo Medium-1 Medium-2 Hi	Open Circuit Closed Circuit Open Circuit Open Circuit
Medium-High Speed (M2)	57 BK (2) *and* 754 LG/W (4)	Lo Medium-1 Medium-2 Hi	Open Circuit Open Circuit Closed Circuit Open Circuit
Hi Speed	57 BK (2) *and* 261 O/BK (1)	Lo Medium-1 Medium-2 Hi	Open Circuit Open Circuit Open Circuit Closed Circuit

CONNECTOR	LOCATION	Page-Figure	Color	Terminals
C100	Through dash at LH side	—		53
C103	Near HEGO sensor	—	BK	4
C104	At battery ground pigtail	—		4
C107	At license lamps	60-2	BR	1
C108	Engine compartment LH side	—	BK	4
C109	RH side #6 crossmember	60-3	GY	4
C110	LH fender apron	—	GY	8
C111	Behind I/P LH end (test)	—	BK	1
C112	LH fender apron	—	BR	8
C113	LH fender apron	—	N	8
C114	LH fender apron	—	BK	8
C115	On rear of engine	—	BK	8
C116	LH fender apron	—	BK	8
C117	At LH front side body marker lamp	61-8	BK	4
C118	LH fender apron	—	BK	8
C119	On dash panel	—	GY	4
C122	RH side of rear cross support	60-3	GY	4
C123	LH side of frame at rear crossmember	109-5	BK	4
C126	LH side of rear crossmember	60-2		2
C129	At RH fender apron (diesel only)	35-1	GY	8
C132	LH fender apron	—	BK	8
C133	LH fender apron/#5 crossmember on dual tank	—	BK	4
C134	LH fender apron	—	BK	8
C135	RH inner fender behind headlamp		BK	1
C136	At rear left quarter panel	71-2		
C151	Engine compartment	—	BK	4
C157	At A/C clutch switch	—	W	2
C158	At blower switch	—	GY	5
C168	Engine compartment test		GY	6
C170	Near ignition module	133-1	BK	2
C171	Engine compartment test	—		1
C174	At proportioning valve, LH frame rail		BK	4
C177	Engine compartment LH side	—	GY	4
C182	Engine compartment LH	—	GY	4
C183	Engine compartment LH	—	BR	2
C185	At alternator	135-3		3
C186	At alternator	—		3
C187	At alternator regulator	139-7	W	4
C188	At alternator	—		2
C190	At clutch lockout switch	—	GY	2
C197	LH side of rear cross support	—	GY	8
C202	Lower hole of LH quarter panel	71-2	GY	4
C202A	Lower hole of LH quarter panel	70-1	GY	4
C203	Lower hole of LH quarter panel	—	GY	4
C208A	At instrument cluster	—		14

CONNECTOR	LOCATION	Page-Figure	Color	Terminals
C208B	At instrument cluster	—		14
C233	Near alternator	—	GY	1
C240	At ignition key, seat belt warning buzzer	—		7
C244	Behind center of I/P	—	BK	8
C248	Engine compartment near starter relay	—	GY/BK	4
C260	Near RH battery		BK	1
C270	At wiper motor	—		3
C271	At wiper motor	—		3
C276	At automatic transmission	—		5
C280	Engine compartment near starter relay	—		6
C284	At 4×4 switch	—	BK	2
C285	LH fender apron near power brake booster	—	GY	4
C285A	LH fender apron near power brake booster	—	BR	4
C285B	At speed sensor	—	BK	2
C289	RH cowl	—	BK	4
C290	RH cowl	—	GY	4
C292	At blower motor	—		2
C293	At blower resistor	—	W	4
C300	Inline fuel pump	—	BK	2
C305	LH side of steering column	—	GY	11
C305A	LH side of steering column	—	GY	11
C305B	LH side of steering column	—	GY	11
C321	LH fender apron near ignition module	—	BK	3
C322	At distributor	—	BK	3
C323	At ignition module	—	BK	4
C333	Behind center of I/P at radio	—		8
C343	LH fender apron near ignition module		BK	8
C344	LH fender apron near ignition module		BK	8
C353	Rear LH side of frame at rear crossmember	60-4	Y	1
C354	At LH rear park & turn lamp	60-4	BK	2
C355	At RH rear park & turn lamp	60-4	BK	2
C356	At RH backup lamp	60-4	Y	1
C357	At LH backup lamp	60-4	Y	1
C358	Behind center of I/P	—	GY	2
C366	Behind I/P near fuse panel	—	GY	3
C366A	Behind I/P near fuse panel	—	GY	3
C366B	Behind I/P near fuse panel	—	GY	3
C370	Transmission extension housing	—	GY	4
C380	Engine compartment LH side	—		2
C385	Near alternator/regulator	—	BK	1

CONNECTOR LOCATION

		Page-Figure	Color	Terminals
C386	Near RH battery	—		1
C406	LH cowl under I/P	—	GY	4
C420	Engine compartment LH side	—	BK	4
C425	RH cowl	—	BK	6
C426	RH cowl side	—	GY	2
C427	RH cowl side — electric shift module	—	GY	8
C428	RH cowl side — electric shift module	—	W	10
C429	RH cowl side — electric shift module	—	BR	5
C430	At electric shift transfer case	—	BK	10
C431	At electronic shift switch	—		6
C450	LH side rear support cross	—	BK	2
C522	Behind center of I/P at radio	—		8
C523	Lower LH cowl access hole	—	BR	2
C524	Lower RH cowl access hole	114-1	BR	2
C550	At windshield wiper/washer switch	102-1	BK	10
C650	At RH door lock motor	—	BK	2
C701	At main light switch	—	BK	8
C714	At speed control amplifier	—	GR	8
C717	At speed control amplifier	—	GY	6
C752	LH side of hood at engine compartment lamp	—		1
C753	At speed control servo	—	BR	6
C755	At clutch switch	—	GR	2
C789	LH side of driver's seat on floor pan	79-1	GY	2
C850	Lower LH cowl access hole	—	GY	4
C906	At LH cowl access hole	—		2
C913	At center of rear body markers	60-5		4
C915	Engine compartment LH side	—	BK	2
C918	Near LH side of rear crossmember	60-2	BK	4
C950	At LH rear	61-8		4
C951	Near RH side of rear crossmember	60-6	BR	2
C952	At front of RH side body marker	—	BK	4
C953	At RH rear	61-8	BK	4
C954	In forward part of cab roof	59-1	BK	2
C955	In forward part of cab roof	59-1	BK	2
C956	In forward part of cab roof	59-1	BK	2
C957	At front of cab roof	59-1	BK	2
C958	At front of cab roof	59-1	BK	2
C1101	Behind I/P LH end	—	BK	3
C1102	Behind I/P LH end	—	GY	4
C1105	LH side of frame at rear crossmember	61-9	BK	4
C1110	LH rear engine compartment	61-9	BR	6
C1111	LH rear of frame	—	BR	3
C1114	LH rear of frame			4
C1206	At rear crossmember	65-1	GY	3
C1907	Behind LH rear lamp	109-4	BR	3
C1951	Behind LH rear crossmember	109-5	BR	1
C1952	Behind LH rear lamp	109-4	BR	1
C1953	LH cowl center access hole	—	GY	8
C1954	RH cowl center access hole	—	GR	8
C1955	LH cowl area	—		2
C1960	On fuse panel	—	N	1
C1962	At fuse panel	—	BL	2
C1963	LH frame rail	—	BK	2
C1964	Engine compartment LH side	—	BK	4

SPLICE LOCATION

S101	Near inline fuel pump T/O	—
S108	Near tailgate power window switch T/O	—
S109	Near tailgate power window switch T/O	—
S110	Near fuel pump relay T/O	—
S111	Near starter relay T/O	—
S112	Near EEC module T/O	—
S113	Near C115 T/O	—
S114	Near C114 T/O	—
S115	Near manifold pressure sensor T/O	—
S116	Near manifold pressure sensor T/O	—
S117	Near C100 T/O	—
S118	Near EEC module T/O	—
S119	Near E40D T/O	—
S120	Near speed control amplifier T/O	—
S121	Near C112 T/O	—
S123	Near EEC module T/O	—
S124	Near backup lamp switch T/O	—
S125	Near backup lamp switch T/O	—
S126	Near C100 T/O	—
S129	Near E40D Transmission	—
S140	Between S142 and S143	—
S142	Near T/O to no. 4 fuel injector	—
S143	Near T/O to no. 8 fuel injector	—
S150	In ignition coil lead	—
S152	Near LH backup lamp T/O	—
S153	Near license lamp T/O	—
S154	Near front fuel gauge sender T/O	—
S155	Near ERBP valve T/O	—
S156	Near fuel line heater T/O	—
S157	Near LH headlamp T/O	—

SPLICE LOCATION

S158	Near LH glow plugs T/O	—
S159	Near RH glow plugs T/O	—
S160	Near ignition coil T/O	—
S161	Near clutch interlock switch T/O	—
S162	Near heater control switch T/O	—
S163	Near heater control switch T/O	—
S165	In T/O to throttle air bypass solenoid	—
S167	In T/O to map sensor	—
S168	Near T/O to EEC diode	—
S170	Near battery	—
S172	Near T/O to EEC diode	—
S174	Near T/O to EEC power relay	—
S175	Near cooling fan relay T/O	—
S176	Near fuel tank selector valve T/O	—
S177	Near fuel tank selector valve T/O	—
S185	Near radio T/O	—
S190	Near backup lamp T/O	—
S200	Near clutch switch T/O	—
S201	Near T/O to C100	—
S202	Near T/O to fuel pump relay	—
S208	Near main light switch T/O	—
S216	Near steering column connector T/O	—
S217	Near ignition switch T/O	—
S220	Near LH courtesy lamp T/O	—
S221	Near ignition switch T/O	—
S270	Between T/O's to EEC power relay	—
S271	Near T/O to C178 (LH side)	—
S272	Near main light switch T/O	—
S276	Near T/O to C178 (LH side)	—
S277	Near T/O to C178 (RH side)	—
S303	Near main light switch T/O	—
S305	In ignition coil lead	—
S350	Near main light switch T/O	—
S352	Near vehicle speed sensor T/O	—
S353	Near vehicle speed sensor T/O	—
S360	Near LH horn T/O	—
S404	Near clutch switch T/O	—
S410	Behind I/P in cooling fan harness	—
S450	Near license lamp T/O	—
S451	Near license lamp T/O	—
S452	Near rear turn/stoplamp T/O	—
S501	Near RH courtesy lamp T/O	—
S503	Near instrument cluster T/O	—

SPLICE LOCATION

S504	Near instrument cluster T/O	—
S507	Near warning buzzer T/O	—
S508	Near warning buzzer T/O	—
S509	Near anti-lock brake module T/O	—
S510	Near anti-lock brake module T/O	—
S511	Near anti-lock brake module T/O	—
S512	Near fuel tank selector T/O	—
S513	Near fuse panel T/O	—
S515	Near driver's tailgate window switch T/O	—
S517	Near LH courtesy lamp T/O	—
S520	Near warning buzzer T/O	—
S530	Near clutch interlock switch T/O	—
S536	Near windshield wiper motor T/O	—
S538	Engine compartment near air charge sensor T/O	—
S543	Near brake sensor T/O	—
S545	Near LH headlamp T/O	—
S547	Engine compartment near HEGO ground T/O	—
S548	Engine compartment near #5 fuel injector T/O	—
S549	Engine compartment near #3 fuel injector T/O	—
S550	Near brake sensor T/O	—
S551	Engine compartment near #3 fuel injector T/O	—
S552	Engine compartment near throttle air bypass solenoid T/O	—
S554	Near speed sensor T/O	—
S555	Near ignition module T/O	—
S556	Near ignition module T/O	—
S560	Near fuel sedimenter bowl T/O	—
S562	Near A/C clutch T/O	—
S563	Near A/C clutch T/O	—
S567	Near T/O to A/C pressure cycling switch	—
S570	Near fuel tank sender T/O	—
S571	Near fuel tank sender T/O	—
S576	Near LH backup lamp T/O	—
S578	Near LH backup lamp T/O	—
S583	Near T/O to A/C clutch coil	—
S584	Near T/O to A/C clutch coil	—
S590	In LH door near power window switch T/O	—
S603	Near blower motor switch T/O	—
S701	Near blower resistor T/O	—
S801	Near headlamp switch T/O	—
S805	Near cigar lighter T/O	—
S806	Near T/O to windshield wiper switch	—
S807	Near LH headlamp T/O	—
S808	Near RH park lamp T/O	—

SPLICE LOCATION

S811	Near ignition switch T/O	—
S814	Near windshield wiper illumination lamp T/O	—
S815	Near G701 T/O	—
S850	Near main light switch T/O	—
S852	Near LH master window control switch T/O	—
S853	Near LH master window control T/O	—
S854	Front LH door near speaker T/O	—
S858	Near LH master window control T/O	—
S902	Near RH side marker lamp T/O	—
S903	Near fuel gauge sender and pump T/O	—
S904	Near license lamp T/O	—
S1004	Near ignition switch T/O	—
S1103	Near RH courtesy lamp T/O	—
S1108	Near rear marker lamp T/O	—
S1109	Near LH front side marker lamp T/O	—
S1152	Near RH front side marker lamp T/O	—
S1205	Near rear license lamp T/O	—
S1207	Near dome lamp T/O	—
S1208	Near dome lamp T/O	—
S1902	Near tailgate power window switch T/O	—

DIODE LOCATION

D100	150 mm (5.9 in.) from a/c clutch	132-3, 4
D101	910 mm (35.9 in.) from cargo lamp	70-1
D200	1117 mm (44 in.) from parking brake switch	—
D201	520 mm (20.5 in.) from ignition switch	—

GROUND LOCATION

G111	RH frame near battery	26-1
G116	Near electronic engine control	—
G117	Near ignition coil	—
G119	Behind I/P near center	—
G155	LH rear of engine	—
G156	Center of dash panel	—
G203	On RH side of engine	21-1, 2

GROUND LOCATION

G208	Near throttle position solenoid	—
G209	Center of dash panel	—
G210	At electronic voltage regulator	—
G211	Near starter motor relay	—
G301	Near underhood lamp	—
G502	Behind LH side of I/P	102-1
G701	Behind I/P at center	—
G703	At brace under steering column	—
G710	LH side of dash panel	—
G711	LH rear of engine	—
G751	At LH side of tailgate	—
G752	In LH door	—
G801	LH inner fender behind headlamp	—
G802	At RH inner fender behind headlamp	—
G803	At fuel sedimenter bowl	—
G804	At lower hole of LH quarter panel	—
G805	At RH inner fender behind headlamp	—
G903	At LH side of crossmember	60-2
G909	At lower LH cowl access hole	—
G1006	Rear LH side of frame at rear crossmember	61-9
G1201	At front LH side of engine	26-1

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